

A revision of the known malaysian
Dragonflies of the genus *Macromia* Rambur,
with comparative notes on species from neighbouring
countries and descriptions of new species,

by

M. A. LIEFTINCK,

Amsterdam.

(With 22 text-figures).

The principal object of this paper, which will be followed by a second on the genus *Epophthalmia*, is a contribution to our poor knowledge about the oriental members of the genus *Macromia*. In this revision little attempt has been made to deal with the fauna of Further India (except Malacca), partly on account of the insufficiently exploration of this vast area, partly because I could not personally examine a number of certainly most interesting species, inhabiting the Tonkinese basin, which country apparently has a very rich *Macromia* fauna.

In the following account I have attempted to gather all notes and indications of habitat of all *Macromia*'s which have been recorded from Malacca, the Sundanese Islands and New Guinea, including those data which are otherwise known to me to occur in these countries. In the case of some species, which I have not been able to compare, I was obliged to add indispensable remarks of other authors, which may, I hope, be of service to others who may come to occupy themselves with this striking genus. I have ventured to provide a dichotomic table in order to facilitate the identification of the species, but I must strongly accentuate that this list includes no less than three species, which I

have not seen; the definition of these species has entirely been derived from the original descriptions ¹⁾).

While employing characters similar to those used by LAIDLAW and RIS, I have classified all the species under discussion in groups, the definition of which are — once more — largely derived from those given by these authors. They are, however, somewhat refashioned and considerably enlarged. Regarding the geographical distribution of the species and their mutual relationship, the reader is referred to some interesting remarks on the related genus *Idionyx*, by Major FRASER, in a recent summarizing paper (Rec. Ind. Mus., Calcutta, 28, III, 1926), where quite similar difficulties have arisen in defining natural "groups", which can well be paraphrased. ["The characters exhibited are shared in such a haphazard way, that one is forced to the conclusion that many of them have had an independent origin", FRASER, loc. cit.]. I have a faint hope that at least my second group will not prove to be a purely artificial one, but that is all I can say.

I have drawn up my list not only from records already available in literature, but I could make many additions from the important material, very generously sent to me by the leading odonatologists, Dr. F. RIS (Rheinau), K. J. MORTON (Edinburgh), Dr. F. F. LAIDLAW (Uffculme) and lastly by Major F. C. FRASER (Bombay). Part of this material has already been discussed by these authors, as noted in the references to literature. To all the above-named gentlemen I desire at the outset to express my appreciation of their most cordial response in the way of material.

During a recent visit to the Brussels Museum, I revised the material in the ancient "Collection SELYS", which contains valuable types and certain puzzling species, named by the late RENÉ MARTIN. Unfortunately some interesting Tonkinese records of species, named by this author, could not be tested on the original objects. I have also studied some *Macromia*'s sent to me by two amateur-entomologists, Mr. F. C. DRESCHER and Mr. G. OVERDIJKINK, in Java, and

¹⁾ In the keys as well as in the further text, I have marked these species with an asterisk.

some specimens in the Musea of Amsterdam, Leiden and Bremen.

Although the total number of species of *Macromia* from the Orient will probably be increased considerably in future, we should keep in mind the species of a more or less problematic value. We may expect that some of these will prove to be only synonyms.

The following publications are of particular interest and should always be compared with the present paper:

- 1899. L. KRÜGER. Die Odonaten von Sumatra, V. Cordulinae. Stettin. entom. Zeitung, II.
- 1916. F. RIS. SAUTER's Formosa-Ausbeute. Supplementa Entomol., V.
- 1922. F. F. LAIDLAW. Some Notes on Oriental Dragonflies, the genus *Macromia*. Journ. Str. Br., Royal Asiatic Soc., 85.
- 1924. F. C. FRASER. A Survey of the Odonate-Fauna of Western India, etc. Rec. Ind. Mus., Calcutta, 26, V.

In total 18 different species of *Macromia* have been included in the keys, 13 of which are discussed more thoroughly in the text. I have examined about 70 specimens and in addition to these, I have been able to examine specimens of *M. cingulata* RAMB. (in coll. SELYS), *bellicosa* FRAS. (ex coll. FRASER), *irata* FRAS. (idem) and *flavocolorata* FRAS. (idem), from India.

There remain to be noted the following species from Malaya of which I have not seen examples:

- M. pyramidalis* MARTIN (unsufficiently known; Tonkin).
- M. clio* RIS (known only in the female sex; Formosa).
- M. corycia* LAID. (well-known; Borneo; included in the key).
- M. callisto* LAID. (idem; Malay Peninsula; included in the key).

The characters used in defining both the groups and the different species, are, for the greater part, unisexual. The females of no less than 6 of the eighteen species are still unknown, whilst in *clio* only the female is known. The size and eventual remarks on the colour-pattern of the body, have always been given in the keys as well as in the separate descriptions.

Although there remain still important gaps in our knowledge about the oriental *Corduliinae* fauna, I hope that this fragmentary paper may contribute at least to a more exact knowledge of these striking and rare insects, and that the employment of characters, which have been found useful in the material before me, will enable the student to identify his material with reasonable certainty.

I. Group of *M. westwoodi* SELYS.

Segm. 2—6 of abdomen unicoloured, all with more or less metallic lustre. Pyramidal processes of frons metallic. Pointed triangular process on dorsum of segm. 10. Pterostigma 1—2.75 mm.

1. Postclypeus for the greater part clear yellow. A well defined band of yellow, incomplete above. ♂ Anal angle of hind wing sharply acute. Lower anal appendage somewhat longer than upper pair. These latter slightly recurved apically and each with a very small, almost obsolete extero-lateral tooth at about the middle of their length. Hamule simple, distal third slender, slightly curved. Large species. ♂ Abd. + app. 48, hind wing 44; ♀ 50, 49. Pterostigma very small, > 1 mm. — Hab. N. Guinea, Cape York. **terpsichore** FÖRST.

Postclypeus always black. Anal angle of hind wing whether or not acute. 2

2. A well defined humeral band of yellow, incomplete above. Apical ends of M_3 and M_4 , in both front and hind wings, strongly and very abruptly curved to the anal wing border ¹⁾. ♂ Anal angle of hind wing rather rounded, not acute. Interior margin of costa with yellow line. Lower anal appendage about equal in length to upper pair. These latter are very slightly recurved apically, and have each a very small, almost obsolete extero-lateral tooth at about the middle of their length. Large species. ♂ abd. + app. 48, hw, 46; ♀ 48, 48. Pterostigma small, 2.6—2.75 mm. — Hab. Malacca, Java **westwoodi** SELYS.

Humeral band absent; lower part of dorsum of synthorax brown, as it passes dorsalwards acquiring a metallic green lustre. Apical ends of M_3 and M_4 normal 3

¹⁾ As in certain species of the genus *Zygonyx*.

3. Hamule simple, extraordinary slender, sickle-shaped. Anal angle of hind wing sharply acute. Large species. ♂ Abd. + app. 54, hw. 44; ♀ 48, 46. Pterostigma very small, > 1 mm. Anal appendages of ♂ almost exactly similar to those of *westwoodi*. — Hab. N. Guinea . **melpomene** RIS.

Hamule not extraordinary slender and never sickle-shaped. Anal angle of hind wing rounded. Smaller species. Pterostigma larger. Anal appendages variable 4

4. Lower anal appendage distinctly longer than upper pair, the latter with apices recurved and with a well-developed extero-lateral tooth on each at about its middle. Hamule almost straight, with a small, but distinct hammer-like process, directed forward and inward, at the extreme tip. Small species. Female unknown. Abd. + app. 45 - 46, hw. 40—42, pt. 2.5—2.7. — Hab. Banka, Sumatra (?), Borneo .

. **cydippe** LAIDLAW

Lower anal appendage equal in length to upper pair, the latter with recurved apices, and with the extero-lateral tooth on each so reduced as to be scarcely visible. Hamule stout, short and well-curved, with its tip somewhat truncated and thickened. Small species. ♂ abd. + app. 43, hw. 43; ♀ 44, 46. Pterostigma short, 1.75 mm. — Hab. Borneo

. **euterpe** LAIDLAW.

II. Group of *M. moorei* SELYS.

Segm. 2—6 of abdomen black, or brownish black, without metallic lustre. Segm. 2—5 at least with yellow markings on the dorsum. ♂ Without a sharply pointed dorsal process on segm. 10 of abdomen ¹⁾. Upper anal appendages recurved apically and with a well-developed extero-lateral tooth on each at about its middle. Anal angle of hind wing rather rounded, never sharply acute. Small part of the ventral margin of the second abdominal segment beset with a row of very stiff short hairs. Excavation of frons deep; upper part divided into two conspicuously flattened parts, each being somewhat

¹⁾ In *M. moorei moorei* a very blunt triangular process may be present, but it is never so well-developed as in the former group. Cf. also the description of *M. pyramidalis* MARTIN.

framed. ♂ Ordinary with *only one cross vein* in the supratriangle (*ht*) of hind wing ¹⁾, and usually with at least 2 basal cross veins in the discoidal field of hind wing, running directly from M_4 to Cu_1 (♂ of *clio* unknown).

The large species *pyramidalis* MARTIN (*Mon. Cordul.*, p. 69, hab. Tonkin) possibly belongs to this group. I have not seen examples of it and it remains still an enigma for me. Certainly bona species.

1. Yellow humeral band absent; lower part of dorsum of synthorax brown, as it passes dorsalwards acquiring a metallic green lustre. Lips reddish or dark brown. 2

Yellow humeral band present. Labium dark brown, middle lobe and base of lateral lobes clear yellow; upper lip black. Front of head spotted with yellow: postclypeus, base of mandibles and usually one or more basal spots on the upper part of frons 3

2. Front of head uniformly reddish brown, or dark brown, without clear yellow markings. Upper part of frons metallic. Neuration dark brown or black. ♂ Anal appendages dark brown or black. Pterostigma to 2.5 mm. — Hab. India to Celebes **moorei** SELYS and **fumata** KRÜG.

Front of head uniformly pale yellow, without dark brown markings. Lips reddish brown. Upper part of frons pale yellow, not metallic. Neuration partly pale yellow. ♂ Anal appendages partly yellow. Female unknown. — Hab. China **icterica**, sp. n.

3. Abdominal segments 3—6 and 8 with large yellow markings, divided at the sides in paired dorsal and lateral portions, the dorsal ones on segm. 3—6 occupying the whole basal half of the segment. Anal field narrow; two rows of cells between the anal loop and the wing border in the hind wing. Valvula vulvae small, deeply excavated. Male unknown. Abd. 53, hw. 47, pt. 3 mm. — Hab. Formosa **clio** RIS *

Abdominal segments 3—6 and 8 (♀) marked as in the

¹⁾ In *M. amphigena* sometimes unsymmetrical two cross veins in *ht* present.

foregoing species, but much smaller. Dorsal markings on segm. 3—6 small, not touching the base of the segment, lying just in front of the transverse carina, that on segm. 3 not separated from its lateral offshoot. ♂ Dorsal and latero-ventral yellow marks on segm. 4—6 very small. ♀ Anal field broad; three rows of cells between the anal loop and the border of hind wing. Valvula vulvae extremely small, simple. ♂ Hamule see fig. 13. ♂ Abd. + app. 48—53, hw. 44.5—47, pt. 2.25—2.5; ♀ 49—51, 47—51, 3 mm. Hab. Japan and Corea. **amphigena** SELYS.

III. Group of *M. cincta* RAMB.

Segm. 2—6 of abdomen black, or brownish black, without metallic lustre. Segm. 2—4 at least with yellow markings on the dorsum. Front of head very dark brown, pyramids of frons black, slightly or not metallic. No definite humeral band on dorsum of synthorax. ♂ With pointed triangular process on dorsum of segm. 10 of abdomen. Upper anal appendages recurved apically and with a well-developed extero-lateral tooth on each at about the middle. Anal angle of hind wing sharply acute. Small part of the ventral margin of the second abdominal segment thickened and beset with a row of very stiff short hairs. Excavation of frons rather deep; upper part of it somewhat flattened, but less than in group II. More than one cross vein in the supratriangle (*ht*) of hind wing. At most one basal cross vein in the discoidal field of the same running directly from M_4 to Cu_1 . At least the extreme base of both front and hind wings with a golden brown mark.

M. cincta* RB.**, et auct. (inclus. ***borneensis KRÜGER).

Hab. Penang, Sumatra, Banka, Java, Borneo, Palawan.

IV. Group of *M. calliope* RIS.

Segm. 2—6 of abdomen black, in some species with metallic green lustre. Second segment at least with yellow markings on the dorsum. A well-defined humeral band of yellow on dorsum of synthorax, incomplete above. ♂ Without distinct process on dorsum of segm. 10

of abdomen ¹⁾). Upper anal appendages straight or incurved apically, whether or not with an extero-lateral tooth. Anal angle of hind wing rather rounded, never sharply acute. Ventral margin of second abdominal tergite without a row of very stiff short hairs. Upper part of frons not flattened nor framed.

Usually more than one cross vein in the supratriangle (*ht*) of hind wing. At most one basal cross vein in the discoidal field of the same running directly from M_4 to Cu_1 .

1. Postclypeus black or dark brown 2
Postclypeus yellow 5
2. Superior anal appendages entirely without an extero-lateral tooth. App. inf. longer than upper pair. Segm. 2—6 slightly metallic. Segm. 2—3 and 7—8 spotted with yellow. Genitalia on segm. 2 (fig. 18). Small species. Abd. + app. 42, hw. 35, pt. 1.75—1.8 mm. Female unknown. — Hab. Sumatra **polyhymnia**, sp. n.

Superior anal appendages with an extero-lateral tooth. Segm. 2—6 black, or black with metallic green lustre . . . 3

3. Segm. 2—6 with metallic green lustre, unmarked, save for a pair of small transverse spots on segm. 2. Upper anal appendages with an extero-lateral tooth near the apex, which is rather abruptly inflected; very similar in shape to those of *M. urania*. Distal third of genital hamule abruptly narrowed, slender, sickle-shaped. Length of hind wing 34 mm. Female unknown. — Hab. Borneo . . . **corycia** LAID*.

Segm. 2—6 black, not metallic. Segm. 2—3 at least with yellow markings, sometimes also on segm. 4—5. Upper anal appendages with an extero-lateral tooth in the middle or near the apex of it 4

4. Upper anal apps. nearly straight, each with a stout extero-lateral tooth, lying exactly in the middle of it. Lower anal appendage a little longer. Distal two-thirds of genital hamule slender, sickle-shaped. Abd. + app. 46.5—47.5, hw. 37, pt. 2.4 mm. Female unknown. — Hab. Tonkin . . .
. **calliope** RIS.

¹⁾ Except *M. gerstaeckeri* KRÜGER.

Upper anal apps. nearly straight, each with a stout, extero-lateral tooth near the apex, which is very slightly inflected. Lower anal appendage as long as upper pair. Distal one-third of genital hamule very slender, abruptly inflected. ♂ Abd. + app. 43, hw. 35, pt. 2; ♀ 42, 39, 2.5 mm. — Hab. Java **septima** MARTIN.

5. Upper anal apps. nearly straight, stout extero-lateral tooth, just beyond the middle of each. Genital hamule slender, straighter than in *calliope*, but otherwise rather similar. Basal yellow ring on segm. 2—7, that on the second segment covering at least its basal half, that on the seventh about the basal third. Segm. 3—6 with paired dorsal lunules, immediately in front of the transverse carina, 8 with paired basal spots. Upper lip black, with transverse bar of yellow at its base. Base of mandibles yellow. Abd. + app. 48, hw. 39, pt. 2 mm. Female unknown. — Hab. ? Assam. **thalia**, n. nom.

Upper anal apps. nearly straight, extero-lateral tooth near the apex, at commencement of distal third. Segm. 6 always black. Upper lip black, wether or not with transverse bar of yellow at base **6**

6. Upper anal apps. slightly incurved apically. Distal quarter of genital hamule abruptly narrowed, hook-shaped (unknown in *gerstaeckeri*!). Anal margin of hind wing, between the membranula and the anal angle concave. Larger species **7**

Upper anal apps. nearly straight. Lower appendage about equal in length. Genital hamule long and slender, almost straight. Anal margin of hind wing, between membranula and the anal angle straight. Upper lip entirely black (?). Segm. 2 of abdomen with yellow ring, narrow and not touching the base of the segment dorsally; 3 with minute yellow spot dorsally on either side of the middle line, in front of the transverse carina. Segm. 4—6 and 8—10 entirely black. Smallest species known. ♂ Abd. + app. < 39, hw. 32, pt. 1.75; ♀ 37.5, 34, 2 mm. — Hab. Malacca **callisto** LAID.*

7. Lower anal appendage slightly shorter than upper pair. Upper lip black, with transverse basal mark of yellow. Segm. 2 of abdomen with yellow ring, narrow dorsally and

not covering the base of the segment, whilst 3—5 have small paired spots dorsally, immediately in front of the transverse carina of each (those on segm. 4—5 very small). Segm. 8 with small pair of basal dorsal spots. Larger species. ♂ Abd. + app. < 45, hw. 35, pt. 2; ♀ 48—49, 40—41, 2—2.5 mm. — Hab. Tonkin . . . **urania** RIS.

Lower anal appendage equal in length to upper pair. Segm. 10 with a blunt dorsal prominence. Upper lip black. Segm. 2 of abdomen with a yellow mark, broken into two pieces dorsally, and each of them into dorsal and lateral parts. Segm. 3 with very small basal yellow line, laterally. Segm. 4—6 black. Segm. 8 with basal lateral mark. Smaller species. ♂ Abd. + app. 40, hw. 33.5, pt. 2; ♀ 37, 37.2 mm. — Hab. Java . . . **gerstaeckeri** KRÜGER.

Group I.

Macromia terpsichore FÖRSTER 1900.

- Macromia terpsichore* ♂ Förster (*Természetrájsi Füzetek*, 23, 1900, pp. 86—88, fig. apps.). Mus. Budapest. — Hab. N. E. New Guinea, Bongoe.
- „ „ ♂ Martin (*Bull. Soc. ent. Ital.*, 60, 1908, p. 198). Mus. Genova? — Hab. Br. New Guinea.
- „ „ ♀ Ris (*Nova Guinea*, IX, 1913, pp. 494—495; fig. 13, wing-photograph of ♀). Mus. Amsterdam. — Hab. W. New Guinea, Bivak-eiland (Noord Rivier vicin.).
- „ „ ♂ Ris (*Idem*, XIII, 1915, pp. 84—85, figs. 2—3, genitalia and anal apps.). Mus. Leiden. — Hab. W. New Guinea, Kloof Bivak.
- „ *viridescens* ♀ Tillyard (*Proc. Linn. Soc. N.S. Wales*, 36, 1911, p. 380, tab. 10, fig. 11). Hab. Cape York, Australia (teste Risi).

Macromia melpomene RIS 1913.

- Macromia melpomene* ♂♀ Ris (*Nova Guinea*, IX, 1913, pp.

496—497, figs. 14—17, genit., apps. and wing-photographs). Mus. Amsterdam. — Hab. W. New Guinea.

„ „ ♂♀ Ris (*Idem*, XIII, 1915, p. 85) Mus. Leiden. — Hab. W. New Guinea, Beaufort Rivier.

***Macromia westwoodi* DE SELYS 1874 (figs. 1—3).**

Macromia westwoodi ♀ de Selys (*Add. au Synopsis des Cordulines*, pp. 16—17). This specimen is the holotype ¹⁾. — Hab. I. Penang (Malacca).

„ „ ♂ Laidlaw (*Ź. Str. Br. Royal Asiat. Soc.*, 85, 1922, p. 219, 222). This specimen is the allotype, now in the Brit. Mus. — Hab. Perak (Malacca).

„ nec „ ♂ de Selys (*2e Add. au Synopsis des Cordul.*, 1878, pp. 23—24). This specimen—Selys' allotype, vide sub *M. cydippe* Laid. — in Mus. Amsterdam. — Hab. I. Banka.

„ nec „ ♂ Krüger (*Stett. entom. Zeitung*, II, 1899, pp. 325—326). Vide sub *M. cydippe* Laid. — Hab. Sumatra (Soekaranda).

„ nec „ ♂ Martin (*Monogr. des Cordul.*, 1906, p. 72). Species not known to Martin by autopsy; the records Borneo and Tonkin are false ²⁾.

Material studied: 10 ♂, 5 ♀, Java, res. Banjoemas, Batoeraden, G. Slamet, 2500 ft., 19—20--21. XI, 18. XII. 1927; 25. I, 25—27. II, 16. IV, 3—9. V and 7. VI. 1928, leg.

¹⁾ DR. LAIDLAW wrote to me (VI. 1927): "The holotype, a female in the Mus. at Oxford, cannot be traced, and must be regarded as lost".

²⁾ The only example in Coll. SELYS, an imperfect ♂, referred by DE SELYS and MARTIN to *westwoodi*, comes from Borneo (Sintang, CLÉMENT); the specimen is in very teneral condition and lacks segm. 6—10. It comes very near *cydippe* LAID., but must be regarded as quite distinct from it on account of the very broad anal area of hind wing, the differently shaped hamule and the extremely slender and pointed lobus. Certainly bona species.

F. C. DRESCHER. Most of the specimens are teneral. — 1 ♀ semiad., Java, Preanger, Soekaboemi (without date, in coll. RIS). A second ♀ from the same locality in coll. LESTAGE (seen and det. DR. F. RIS).

For description and figuring I have selected an adult ♂ from Batoerraden and the ♀ from Soekaboemi, which is the plesiotype.

♂ ad. — All parts of the face uniformly reddish brown, without black or yellow markings. Clypeus and lower part of frons dark brown; lower part of frons granular, its upper portion metallic green. Upper part of frons and vertex bright metallic green, its inner portions not flattened nor framed. Synthorax for the greater part metallic green above and at the sides. A well-defined humeral band present; below this band occupies the whole first pleurum, extending more than $\frac{3}{4}$ up the dorsum; above it is narrowed. Lateral stripe over the stigma pale yellow, sharply defined (1 mm.); this stripe broadens below the stigma (ca. 1.5 mm.) and meets the lower part of humeral band against the coxa 2. Thorax brown ventrally. Legs black. Tibial lamina yellowish, along nearly the full length of third pair, distal half of first pair, absent on second pair.

Wings hyaline, some groups of cells and veins irregularly smoky; a distinct tinge of yellow in the anal field. Interior margin of costa with conspicuous yellow line. Membranule light greyish, a trace darker at the end. Anal angle not acute. Margin between membranule and angle distinctly concave (rather more than in *cydippe*). Nodal index $\frac{7.15 \cdot 15.8}{9.9 \cdot 9.10}$;

$Cux \frac{4.4}{4.4}$; $ht \frac{4.4}{2.2}$. — I would call attention to a peculiarity in the neururation of this species. The apical curving of some of the main veins in both front and hind wings (especially M_3 and M_4 in the hind wing) is abrupt in a very striking way, as in species of the genus *Zygonyx*, and even more than in *Epophthalmia* ¹⁾.

¹⁾ In *Macromia* this feature seems to be variable, as e.g. in *polyhymnia*, *septima* etc., it is absent, in *cydippe* it is rather conspicuous, but in *westwoodi* it is very much so.

Abdomen slender, segm. 1--2 and 7--9 moderately inflated in lateral dimension (somewhat more than in *cydippe*). Segm. 1--6 unicoloured, especially segm. 2--5 with rich metallic

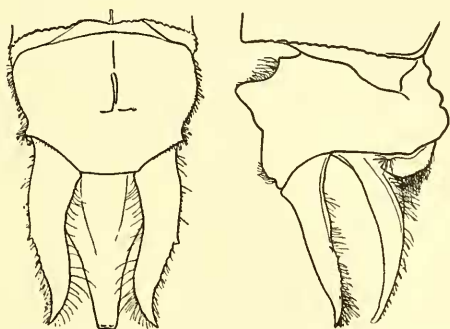


Fig. 1. — *Macromia westwoodi* SELYS, ♂. Batoerraden. Appendages, dorsal view and right side.

green lustre. The remaining segments dull blackish. A well-defined orange yellow mark roundabout the base of segm. 7 occupies rather more than its basal fifth, and bears a very distinct protuberance at the end. Appendages black. Upper pair with a very small extero-lateral tooth. Inferior appendage of equal length (fig. 1). The genitalia of the second segment (fig. 2). The genital lobe carries a stiff and dense brush-like bunch of hairs, directed forward (rather more conspicuous than in *cydippe*, resembling still more *M. fumata*). The hamule is short, not extending to the apex of the narrow lobe, and comparatively broad.

Length: Abd. + app, 48,

hw. 45.5 : 13.5, pt. $\frac{2.6}{2.75}$ mm.

♀ semiad. (Soekaboemi). — All parts of face uniformly reddish brown, as in the male. Lower part of frons granular. deep reddish brown, upper part of frons and vertex metallic green. Synthorax for the greater part metallic green above and at the sides. A not so very well defined humeral band present,

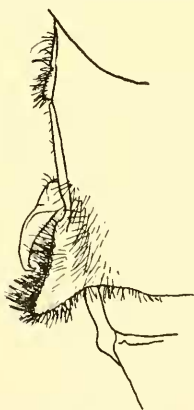


Fig. 2. — *Macromia westwoodi* SELYS, ♂. Batoerraden. Genitalia.

extending about halfway up the dorsum, which is metallic green above only. Lateral yellow stripe over the stigma sharply defined (1 mm.); this stripe broadens below (ca. 2 mm.) and meets the lower part of the humeral band against the coxa 2, as in the ♂. Thorax brown ventrally. Legs black, bases of femora brownish.

Wings hyaline; costa black. Membranule dark grey. Pterostigma dark brown. Nodal index $\frac{9.16|15.10}{11.9|9.12}$; $Cux \frac{6.5}{4.4}$; $ht \frac{4.3}{2.2}$.

Abdomen (deformed by pressure) dorsally unicoloured, with rich metallic lustre. Segm. 1–3 metallic green (segm. 2 somewhat brownish at the sides), the remaining segments copper-coloured. A well-defined yellowish mark on the base of segm. 7 occupies its basal third; sides of segm. 8–9 with trace of a yellow spot at the base. Vulvar lamina short, in agreement with DE SELYS' description (fig. 3).

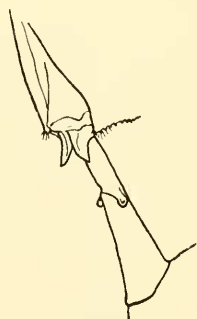


Fig. 3. — *Macromia westwoodi* SELYS, ♂. Soekaboemi. Valvula vulvae, and part of segm. 8–9, latero-ventral view.

Length: Abd. 48, hw. 48:15, pt. $\frac{2.3}{2.5}$ mm.

♀ juv. (Batoerraden). It differs only as follows:

Humeral band conspicuous, pale yellow, extending about $\frac{3}{4}$ up the dorsum, narrowed above. Wings hyaline, with pale yellow tinge at extreme base of all four, reaching as far as first antenodal. Nodal index: $\frac{8.16|15.9}{10.10|9.10}$; $Cux \frac{6.6}{4.4}$;

$ht \frac{3.4}{2.2}$. Length: Abd. 49, hw. 49:15, pt. $\frac{2.75}{2.6}$ mm.

As the description shows, these Javan specimens fully agree with LAIDLAW's type from Perak. I hope that all the difficulties in the identification of this species now may be ended.

***Macromia cydippe* LAIDLAW 1922 (figs. 4—6).**

- Macromia cydippe* ♂ Laidlaw (J. Str. Br. Royal Asiat. Soc., 85, 1922, pp. 219—220, 222—223, textfig. 2—3. Brit. Mus. — Hab. Borneo (Sarawak).
 „ *westwoodi* ♂ Selys (2e Add. au Synopsis des Cordul., 1878, pp. 23—24). This specimen = Selys' allotype. Mus. Amsterdam. — Hab. I. Banka.
 „ ? *westwoodi* ♂ Krüger (Stett. entom. Zeitung, II, 1899, pp. 325—326). Mus. Stettin. — Hab. Sumatra (Soekaranda).

Material studied: 1 ♂ ad., Banka, leg. TEYSMAN, 1872 (Mus. Amsterdam). 1 ♂ ad. Br. N. Borneo, G. Marapok, Dent Province, without date, collector G. — This specimen was labelled: „*Macromia* spec., bei *Moorei* SELYS”, det. Dr. F. RIs. (Mus. Leiden).

The two present males, both fully adult, of which I have been able to make careful drawings of the appendages and the genitalia are, without doubt, conspecific and should be regarded as true *cydippe* LAIDLAW ¹⁾.

♂ Banka (well-preserved, save for the glued thorax, which was broken into two pieces). — The original description of DE SELYS, made from this specimen, can be completed as follows:

All parts of face uniformly dark brown. Lower part of frons granular, somewhat stripy, less metallic green than the upper part and vertex. Synthorax metallic green above and at the sides; lower part of dorsum brown, as it passes

¹⁾ When first examining the Banka specimen only, I hesitated in referring it to *cydippe*, but as I have seen a second specimen now, I have no more doubt of it. I sent my figures of the Banka male to Dr. LAIDLAW, the first examiner who realized the confusion caused by DE SELYS in referring his ♂ type-specimen from Banka to the same species as his *westwoodi* ♀ from Penang (LAIDLAW, loc. cit., p. 223). Dr. LAIDLAW wrote to me, after having seen my figures: “I would suggest that the Banka specimen is either to be referred to my *cydippe* and that the differences lie within the range of variations of characters found in that species, or as a second quite likely possibility, that the Banka specimen is neither *westwoodi* SELYS nor yet *cydippe* LAID., but a distinct but allied species, lying perhaps nearer *cydippe* than *westwoodi* . . .” (VI. 1927). I feel sure that his first supposition is correct.

dorsalwards acquiring a bright metallic green lustre: no definite humeral band. Lateral yellow stripe invisible (see above). Terminal margin of the metepimeron with a small, but distinct yellowish stripe, confluent with the brown underside of synthorax. Legs black, first femora brown at base. Tibial lamina whitish, along nearly the full length of third pair, less than distal half of first pair, absent on second pair.

Wings hyaline, slightly tinged with yellow in the anal field. Interior margin of costa with a very fine yellow line. Membranule whitish, a trace darker at the end. Anal angle not acute. Margin between membranule and angle slightly

concave. Nodal index $\frac{6.15}{10.10} \bigg| \frac{15.6}{10.9}$; $Cux \frac{5.6}{3.3}$; $ht \frac{3.3}{1.1}$.

Abdomen slender, segm. 1—2 hardly inflated; 3—6 slender, cylindrical; 7—9 scarcely dilated in lateral, much in dorsoventral dimension. Segm. 1 dull ferrugineous: segm. 2—6

unicoloured, with rich metallic green lustre. (It may be noted that segm. 3 bears an indication of a minute yellow line roundabout its middle). The remaining segments dull blackish. — A well-defined creamy-yellow mark on the base of segm. 7 occupies its basal fifth, and bears a minute triangular protuberance at the end. Appendages black (fig. 4, a and c). The genitalia of the second segm. (fig. 4b). I would call special

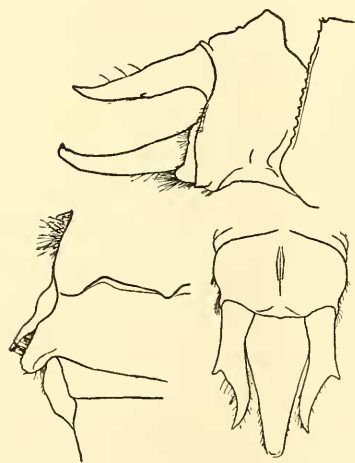


Fig. 4 a-c. — *Macromia cydippe* LAID.
♂ (Allotype *westwoodi* SEL.) Banka.
a and c Appendages, b Genitalia.

attention to a peculiarity in the shape of the extreme tip of the hamule; here the point of the hamule bears a small, but distinct hammer-like process, directed backward and inward. I believe this feature to be of great interest, as

it is present in both specimens of *cydippe* and in no other species examined by me¹⁾.

Length: Abd. + app. 45, hw. 41 : 12, pt. $\frac{2.6}{2.5}$ mm.

♂ Borneo. — Habitus exactly alike the foregoing ♂. — Lower part of dorsum of synthorax brown to a somewhat

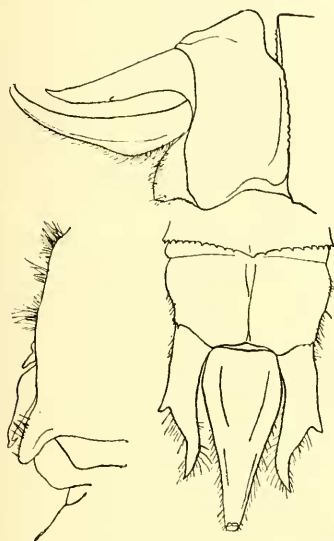


Fig. 5 a-c. — *Macromia cydippe* LAID.
♂. Marapok. a and c Appendages,
b Genitalia.

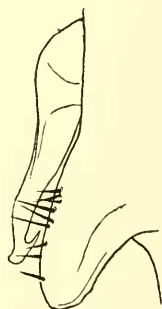


Fig. 6. — *Macromia cydippe*
LAID. ♂. Marapok.
Genitalia, highly enlarged.

greater extent. Lateral yellow stripe well marked (1 mm.). Wings hyaline, with the slightest tinge of yellow in the anal field. Yellow line on the inner margin of costa hardly visible. Neuration of wings almost identical. Nodal index

$\frac{7.16}{9.10} \mid \frac{16.6}{11.10}$; *Cux* $\frac{5.5}{4.4}$; *ht* $\frac{3.3}{2.2}$. No indication of a yellow

line roundabout the third segment. Appendages black (fig. 5, a and c). Genitalia (Fig. 5b en 6). The slight difference in the shape of the hamule (cf. fig. 4b and 5b) is caused by the penis, which has devided the accessory parts of the genitalia from each other in the Bornean example; accordingly the

¹⁾ LAIDLAW (loc. cit.) perhaps may have overlooked this character Cf. also *M. amphigena* SELYS.

hammer-like process at the end of the hamule was also better seen in profile (I have leaved out the penis in the figure). The apparent difference in length of the inferior appendage is explained by the appendages in the *Banka* specimen being "opened", in the Bornean insect "closed".

Length: Abd. + app. 45.5, hw. 42 : 12, pt. $\frac{2.6}{2.5}$ mm. — The ♀ remains still unknown.

Macromia euterpe LAIDLAW 1915 (figs. 7—8).

Macromia euterpe ♂♀ Laidlaw (*Proc. Zool. Soc., London*, 1915, pp. 26—29, textfig. 1, 2).

„ „ ♂♀ Laidlaw (*J. Str. Br., Royal Asiat. Soc.*, 85, 1922, p. 223).

DR. LAIDLAW has been kind enough to present me with the paratype from his own collection (N. Borneo, Kina Baloe, medio IX. 1913, J. C. MOULTON). I can dispense with an ample discussion of this species, as it has been described already in detail. The original description is accompanied by a good figure of the anal appendages of the ♂ (seen in profile) and a photograph of the wings; later on the species has been tabulated together with its allies. A second figure of the appendages made from LAIDLAW's paratype and now seen from above, may be useful, especially in order to show the very small, almost obsolete tooth on the outer margin of the upper pair (fig. 7). At the same time I have taken

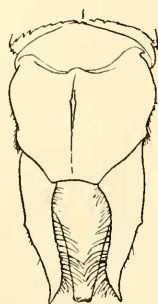


Fig. 7. — *Macromia euterpe* LAID. ♂. Paratype. Kina Baloe. Appendages dorsal view.



Fig. 8. — *Macromia euterpe* LAID. ♂. Paratype. Kina Baloe. Genitalia.

the opportunity in figuring also the genitalia of this ♂.

The genital lobe is small and is covered with a brush-like bunch of hairs directed forward (in *cydippe* these stiff hairs are also present, but less numerous). The hamule is short, stout and well curved, whilst the tip of each is thickened (fig. 8). The types of this species are in the British Museum.

Group II.

Macromia moorei moorei DE SELYS 1874 (fig. 9).

- Macromia moorei* ♂ de Selys (*Add. au Synopsis des Cordul.*, 1874, pp. 17—18). This is the holotype, not present in Mus. Brussels (teste Selys in coll. Moore). — Hab. Himalaya.
- „ „ ♀ de Selys (*2e Add. au Synopsis des Cordul.*, 1878, p. 24). This is the allotype, in Mus. Brussels. — Hab. Khasia Hills.
- „ „ ♂ Kirby (*Proc. Zool. Soc., London*, 1886, pl. 33, fig. 2). Probably belonging to this species. — Hab. N. W. India (Chittar).
- „ „ Krüger (*Sett. entom. Zeitung*, 1899, pp. 333—335). Discussion only.
- „ „ ♀ Martin (*Mon. des Cordulines*, 1906, p. 68). Females only.¹⁾
- „ „ ♂♀ Fraser (*Journ. Bombay N. H. Soc.*, 27, 4, 1921, pp. 683—684)²⁾. — Hab. Khasia Hills, Assam; Deccan.
- „ *trituberculata* ♂♀ Fraser (*Ibid.* pp. 685—686). — Hab. Assam (Shillong).
- „ „ ♂ Fraser (*Rec. Ind. Mus.*, Calcutta, 26, 1924, pl. 25, fig. 10). Fig. of male genitalia.

Material studied: 1 ♂ ad. (def.), India, ? Deccan, Ahmednagar, leg. TIEFERMANN (Mus. Bremen). 1 ♂ ad., Assam, Shillong, VI-VIII. 1925, leg. JANSON (coll. MORTON). 2 ♂ ad., Assam, Shillong, 5000 ft, 26. IV and 16. V. 1924, leg.

¹⁾ A male from "Inde" in Mus. Brussels and mentioned by MARTIN in his monograph as belonging to *M. moorei*, belongs to an other, allied species. As yet I have not been able to identify it with certainty. Bona species.

²⁾ The wing photograph (fig. 3) on p. 681 is certainly not of *M. moorei* SELYS, as stated by FRASER.

FLETCHER, *M. trituberculata* FRAS., det. FRASER (coll. LAIDLAW). 1 ♂ ad., Darjeeling Distr., Mangpu, 3000 ft., 5. VI. 1927, leg. FRASER (coll. m.). 1 ♂ ad., Sikkim, ex STAUDINGER (Mus. Leiden). 1 ♀ ad., Khasia Hills, ATKINSON, labelled "*M. moorei* S." in DE SELYS' own handwriting. Allotype (Mus. Brussels). 1 ♀ ad., Karo, Assam, 1. VI. 1889, labelled "*M. moorei* SEL., révis. R. MARTIN 1906" (Mus. Brussels). 2 ♀ ad., Assam, Shillong, 6000 ft., 6. VIII. 1919 and 4. IV. 1926, leg. T. B. F. (ex coll. FRASER, in coll. m). Abdomen missing in one ♀.

This species has already been described by several authors. FRASER especially gave a very thorough description of both *moorei* and his *trituberculata*. Major FRASER has been kind enough to write me that one should regard the last named species as a true *moorei*, only somewhat modified in a few respects, which are of no importance. Therefore the reader is referred to his paper, where the two species are discussed (loc. cit. 1921). For comparison with the subspecies *moorei fumata*, described below, I think it worth while to make some remarks on the typical race.

♂ ad. Darjeeling. — Lower part of frons but little granular, covered with very fine pits, dark brown; excavation of frons deep, the upper part divided into two conspicuously flattened parts, each being somewhat framed and of a brilliant metallic green colour. (These features exactly as in *fumata*). Synthorax bright metallic green. Lower part of dorsum rich reddish brown, bright metallic green above. Sides with brilliant metallic green lustre. Lateral yellow stripe straight, canary-yellow. Wings entirely hyaline, or slightly tinged with yellow in the anal area of the hind wings. Reticulation as in *fumata*. Interior margin of costa with a very fine yellow line (not black, as stated by the authors). Membranule and anal angle as in *fumata*. Nodal index $\frac{8.14}{9.9} | \frac{14.8}{9.9}$; *Cux* $\frac{4.4}{3.3}$; *ht* $\frac{3.3}{1.1}$ (sic!). There are 2 or 3 basal cross veins in the discoidal field of hind wing running directly from M_4 to Cu_1 ¹⁾. Pterostigma dark brown, narrow.

¹⁾ A character of the whole group.

Abdomen stout; yellow markings as described by the authors, *all markings somewhat larger than in fumata and always of a very clear, yellow colour*. Segm. 1 black (not reddish brown as in *fumata*). Segm. 6 remains black. Anal appendages as described by the authors, not differing from those of *fumata*. The genital lobe of second segment conspicuous, *not broader at base than at apex, rather narrow, densely covered with a brush-like bunch of hairs, directed forward*¹⁾.

Hamule long and slender, *its distal $\frac{2}{3}$ part*, which is always clearly visible in profile view, *straight, only bent downward and outward at the extreme tip* (fig. 9).

Length: abd. + app. 47, hw. 43 : 13, pt. 2 mm.

♀ ad. Khasia Hills. — Allotype. Lower part of frons dull yellowish, shining, not metallic, with somewhat darkened, brownish centre. The framed upper part yellowish, with an almost invisible metallic shade²⁾. Thorax as for male. Legs very dark brown, almost black. Wings smoky, or often saffronated as far as the arculus, with black reticulation (teste FRASER, 1921). In all specimens, now before me, — except one ♀ from Shillong — the wings are entirely hyaline at base, but distinctly yellowish between nodus and pterostigma. Reticulation : all cross veins between *C* and *A*₁ in the basal half of all wings, including the inferior margin of the costa itself, more or less yellowish brown. Nodal index

$\frac{10.15}{12.10} \bigg| \frac{16.9}{11.11}$; *Cux* $\frac{5.5}{3.3}$; *ht* $\frac{3.3}{1.1}$ (sic!). No

basal cross vein in discoidal field of hind wing running directly from *M*₄ to *Cu*₁.

¹⁾ The curious thickening of a small part of the ventral margin of the tergite, close to the posterior end of the first segment (as it is present in *cincta*), is obsolete in this group, but it is beset with the same very stiff short hairs as found in that species.

²⁾ In a very old female from Shillong, which lacks its abdomen, the upper part of the frons is metallic green.

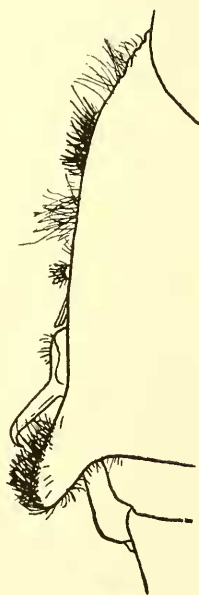


Fig. 9. — *Macromia moorei moorei* SEL.
♂. Sikkim. Genitalia.

Pterostigma dark brown, narrow.

Abdomen very stout. Markings much larger than in the ♂, bright orange yellow and very conspicuous on all segments (see FRASER's description). On segm. 8 and 9 only some diffuse, darkened latero-ventral marks at the base are visible. Length: abd. + app. 50, hw. 46:14, pt. 2.25 mm.¹⁾

The other females, examined by me, do not differ from the type-specimen, except the old female from Shillong, already mentioned above.

With *M. borneensis* KRÜGER, (= *cincta* nob.), this species has nothing to do, contrary to FRASER's statement.

Macromia moorei fumata KRÜGER 1899 (figs. 10, a-c).

Macromia fumata ♂♀ Krüger (*Stettin. entom. Zeitung*, 60, 1899, pp. 333—335). Mus. Stettin. — Hab. Java.

„ *moorei malayana* ♂ Laidlaw (*Proc. Zool. Soc., London*, 1928, pp. 133—134). — Hab. Malacca (Pahang). Brit. Mus.

Material studied: 1 ♂ ad. Java, Preanger, G. Halimoen, 1500 ft., VII—VIII. 1927, leg. G. OVERDIJKINK (coll. m.). 3 ♂ ad., 1 ♀ juv. Java, FR. 93, in DE SELYS' handwriting (Mus. Brussels). 1 ♂ ad. Java, without date, ex STAUDINGER 1903. This specimen was labelled: *Macromia cincta* RB., det. H. W. VAN DER WEELE (Mus. Leiden). 1 ♂ ad. Celebes mer., Lompo Battau, III. 1896, leg. H. FRUHSTORFER (coll. RIS).

After much reflexion I have thought it the best to regard KRÜGER's species as a distinct geographical race of *M. moorei* SELYS. As stated already by KRÜGER himself (loc. cit.), *fumata* has very close affinities to the western *moorei*, but, at the time of the examination of his *fumata*, KRÜGER had to rely on the existing descriptions of *moorei*, as he had no material of this latter species. The characters which are common to both races are easily found out, but, for the differences the best thing would be to record them, for convenience' sake, at the end of the separate discussion, in a table.

¹⁾ FRASER (1921, loc. cit.) gives: hind wing 57 mm; this number apparently is a typographical error.

M. fumata has been described in a sufficient way; I think, however, a more detailed description and some figures of the male appendages and genitalia, may be welcome, especially because the material, now before me, is quite suitable for a full discussion. I have selected the best preserved male for illustration and description.

♂ ad. Java (Halimoen). — Labium and other parts of the face dark brown. Mandibles reddish brown. Labrum distinctly bordered with black at the end. Lower part of frons little granular, covered with very fine pits, dark brown. Excavation of frons deep; the upper part divided into two rather conspicuously flattened parts, each being somewhat framed and of a brilliant metallic green colour. Vertex dark brown. Occiput black, lower lateral portion dark brown. Synthorax metallic green above, much less at the sides. Lower part of dorsum dark brown, *with a slight mingling of metallic green, as it passes dorsalwards acquiring soon a metallic green lustre*; yellow humeral band absent. Sides of the thorax dark brown *with slight metallic green lustre, especially along the lateral yellow stripe*. This stripe well-marked (1 mm.), straight, *pale yellow*, running over the stigma and rather abruptly leaving off. Thorax ventrally reddish brown. Legs black. Tibial lamina yellowish brown, along nearly the full length of third pair, less than distal half of first pair, absent on second pair.

Wings with a slight yellowish tint throughout, some groups of cells and veins irregularly smoky. Base of hind wings broad, ca. 1 mm. wider than in *moorei*, with comparatively open reticulation. Interior margin of costa with a very fine yellow line. Basal $\frac{3}{4}$ of membranule white, fading gradually into dark grey. Anal angle rather rounded. Margin between membranule and angle slightly concave. Nodal index $\frac{10.15.15.10}{11.10.9.11}$; *Cux* $\frac{5.5}{3.3}$; *ht* $\frac{3.3}{1.1}$ (sic!). There are 3 basal cross veins in the discoidal field of hind wing running directly from M_4 to Cu_1 (cf. also *moorei*). Pterostigma dark brown, narrow. Abdomen stout; *segm. 1 dark reddish brown*; *segm. 2* and base of *3* dark brownish at the sides. The remaining segments black, without metallic lustre (as in the typical

race and in the group of *M. cincta*). Segm. 2 has a *small transverse band of a dull creamy yellow colour*, running across the dorsum from one auricle to the other, not touching the base or apex of the segment. It is not narrowed by the longitudinal median carina, but exactly widened in the middle. Segm. 3—5 with paired *dull orange yellow* lunules on the dorsum of each segment, immediately in front of the transverse carina, progressively smaller from before backwards, whilst 6 is entirely black. Segm. 7 has a *brownish orange mark* at base, occupying about a third of the length of the segment; it bears a small triangular protuberance at the end. Remaining segments black, dark brown ventrally. A distinct longitudinal ridge on dorsum of tenth segm. present, but no dorsal process.

Appendages very dark brown, almost black. Basal half of upper pair brownish at base, rather pointed at the end. Lower appendage of equal length (fig. 10, a and c). *The genital lobe of second segment conspicuous, much broader at base than at apex*, and densely covered with a brush-like bunch of hairs, directed forward. Hamule long and slender,

its distal $\frac{2}{3}$, which is always clearly visible in profile view, gradually arched as far as the extreme tip (fig. 10b).

Length: abd. + app. 49, hw.

45 : 14, pt. $\frac{2.3}{2.5}$ mm. (KRÜGER:

Abd. + app. 48.5—49, hw. 44—45 : 13, pt. 2—2.25).

This specimen is the plesiotype. In my collection.

♂ ad. Java (STAUDINGER). This specimen is almost identical with the foregoing. It differs as follows:

Nodal index $\frac{8.14}{11.9} | \frac{15.9}{10.10}$; *Cux*

$\frac{5.6}{3.3}$; *ht* $\frac{4.3}{1.1}$ (sic!). Two basal cross

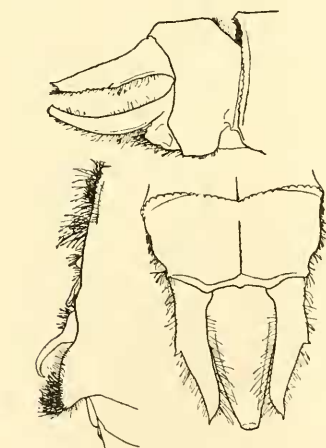


Fig. 10 (a—c)

Macromia moorei fumata KRÜG.

♂. Soekaboemi. -- a and c

Appendages, b Genitalia.

veins in discoidal field of hind wing running directly from

M_4 to Cu_1 . Length: abd. + app. 49, hw. 46 : 14.5, pt. $\frac{2.3}{2.3}$ mm.

♂ ad. Celebes (coll. RIS). — Exactly similar to other specimens. Nodal index $\frac{9.14.14.10}{12.8.10.11}$; Cux $\frac{4.5}{3.3}$; ht $\frac{3.3}{1.1}$ (sic!).

In left hind wing 2, in right hind wing 3 basal cross veins running from M_4 to Cu_1 . Length: abd. + app. 48, hw. 45 : 13.5, pt. $\frac{2.3}{2.5}$ mm.

3 ♂ ad. Java (Mus. Brussels). Exactly similar to other specimens. Nodal indices $\frac{9.14.14.10}{12.10.9.12}$, $\frac{10.15.15.10}{10.10.10.12}$ and

$\frac{8.14.14.9}{10.8.9.11}$; Cux $\frac{5.4}{3.3}$, $\frac{5.4}{3.3}$ and $\frac{4.4}{3.3}$; ht $\frac{2.3}{1.1}$, $\frac{4.3}{1.1}$ and $\frac{3.3}{1.1}$ (sic!).

Number of basal cross veins in discoidal field of hind wing from M_4 to Cu_1 : 3.2, 2.3 and 3.2.

1 ♀ juv. Java (Muss. Brussels). — The only female, which I have seen, agrees in most respects with the male, and with the original description. As the specimen is very young, I am not able to describe it thoroughly. Nodal index

$\frac{9.13.14.9}{11.9.9.10}$; Cux $\frac{5.5}{3.3}$; ht $\frac{3.3}{1.1}$ (sic!). One basal cross vein

in the discoidal field of hind wing from M_4 to Cu_1 . Length of hind wing 49.5 mm.

The males of the two subspecies may be discriminated as follows:

moorei moorei.

1. Synthorax bright metallic green, especially at the sides and on dorsal third of mesepisternum.
2. Light markings on thorax and abdomen clear yellow.
3. Genital lobe narrow, not broader at base than at apex.

moorei fumata.

1. Synthorax golden brown, with slight metallic green lustre at the sides, more conspicuous on dorsal third of mesepisternum.
2. Light markings on thorax and abdomen dull orange yellow, those on abdomen less extensive.
3. Genital lobe much broader at base than at apex.

moorei moorei.

4. The free distal two-third of hamule straight, only bent downward and outward at extreme tip.

moorei fumata.

4. The free distal two-third of hamule gradually arched as far as the extreme tip.

Concerning the females, I dare not to express myself on the real differences, because of *M. moorei fumata* only a very young specimen has been examined.

Just in time I obtained a copy of Dr. LAIDLAW's paper on oriental Odonata, quite recently published in the *Proc. Zool. Soc. of London*, 1928, in which paper the author describes a *Macromia* from Pahang (Malacca). Though I have not seen this specimen, the description makes it evident that LAIDLAW's *moorei malayana* represents the true *fumata* KRÜGER.

***Macromia icterica* sp. nov. (figs. 11—12).**

1 ♂ ad., China, Canton (coll. K. J. MORTON).

Labium and labrum light reddish brown, without black markings. Clypeus and frons dull greyish yellow; upper part of frons and vertex sandy yellow, without metallic shine, its inner portion flattened and somewhat framed, ivory yellow. The whole face is beset with fine, short black hairs. Occipital triangle and occiput shining black. Synthorax for the greater part metallic green above and at the sides. Lower part of dorsum bright orange brown. Below this colour occupies the whole infra-episternum and, above, also the basal half of the episternum of the mesothorax. At the sides it is straight cut off and sharply defined, fading into bright metallic green above and especially along the median carina. Sides of the thorax bright metallic green. Ante-alar ridge and a very conspicuous lateral stripe running over the stigma, light citron-yellow; this stripe is straight, about 1.5 mm. broad (above the stigma), narrowed below and abruptly leaving off between second and third coxa. Hinder $\frac{2}{3}$ part of the metepimerum and the whole ventral side of thorax orange brown. Legs black. Tibial lamina yellowish, along

nearly the full length of third pair, less than distal half of first pair, absent on second pair.

Wings with a golden tint throughout and a slight tinge of gold in the anal field. Costa and many cross veins in the fronto-basal half of the wings citron-yellow (very conspicuous in the costal and cubital spaces). For the rest the reticulation is brownish. Membranule whitish. Anal angle rather rounded. Margin between membranule and angle slightly concave. Pterostigma narrow and small, brown. Nodal index

$$\frac{9.13.}{11.8.} \left| \frac{13.8}{8.9} \right; Cux \frac{5.5}{3.3}; ht \frac{3.4}{1.1} \text{ (sic!).}$$

Abdomen: segm. 1—2 much inflated in dorso-ventral dimension, 1—2 and 7—9 moderately dilated in lateral. Ground colour deep black, without metallic lustre. Segm. 1 black. Basal half of segm. 2 with a transverse band of citron-yellow, roundabout the segment, just including the auricles. This band bears two minute distal protuberances just in its middle, above. Segm. 3—6 with large orange marks roundabout the segments, placed immediately in front of the transverse carina, progressively smaller from before backwards.

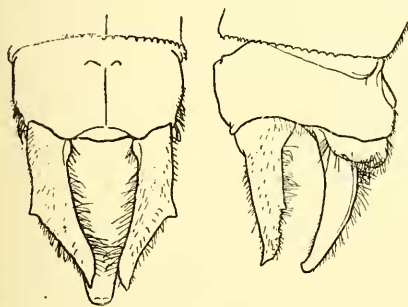


Fig. 11. — *Macromia icterica*, nov. ♂. Canton. Appendages, dorsal view and right side.

Each of these marks has a small triangular incision in front. On segm. 3 it occupies about $\frac{1}{3}$, on segm. 6 about $\frac{1}{6}$ of the total length of the segment itself. The marks are considerably enlarged ventrally. Basal half of segm. 7



Fig. 12. — *Macromia icterica*, nov. ♂. Canton. Genitalia.

with a broad orange band, round the segment, whilst 8 bears a small triangular basal yellow spot on the dorsum only, occupying about $\frac{1}{5}$ of the length. Seen from below, this segm. has its basal $\frac{1}{3}$ of a dull orange colour. Segm. 9—10 black above; lateral and ventral portions orange brown. No definite pointed triangular process on the dorsum of segm. 10. A very small tubercle on each side of the longitudinal ridge present, placed just before it, at base (fig. 11). Appendages orange yellow. Superior pair darkened exteriorly and at the tips, each with a distinct extero-lateral tooth just in its middle. Appendix inferior a trace longer (fig. 11). Genitalia on the second segm. very similar to those of *moorei* and *fumata* (fig. 12).

Length: abd. + app. 45.5, hw. 42 : 12, pt. $\frac{2}{2}$ mm. — Female unknown.

The yellow face, the alternating citron-yellow, black and orange colours on thorax and abdomen, the absence of a process on the 10th segment and the yellow appendages, distinguish this beautiful new species from all its oriental allies. The remarkable pale colour is again exhibited in the wings. In general appearance and in some important structural features it has much in common with *M. moorei* SELYS. Therefore I place this species in the same group.

The specimen is the holotype.

****Macromia clio* RIS 1916.**

Macromia clio ♀ Ris (*Supplementa Entomologica*, Berlin, V, 1916, pp. 67--68, Taf. 3, fig. 1). Mus. Berl.-Dahlem. — Hab. Formosa.

***Macromia amphigena* DE SELYS 1871 (fig. 13, a—b).**

Macromia amphigena ♂♀ Selys (*Synopsis des Cordul.*, 1871, pp. 101—103). Types Mus. Brussels. — Hab. Japan.

„ „ ♂♀ Martin (*Monographie des Cordul.*, 1906, p. 65, fig. 83). -- Hab. Japan.

- Macromia fraenata* ♂ Martin (*Idem*, pp. 71—72, fig. 82 and 86, Pl. III, fig. 15). Mus. Brussels.
— Hab. Corea.
- „ nec „ ♂ Laidlaw (*J. Str. Br. Royal Asiat. Soc.*, 85, 1922, pp. 226—227, fig. 7).
Vide sub *thalia* nov. nom.
- „ nec „ ♂ Fraser (*Rec. Ind. Mus.*, Calcutta, 26, 1924, pl. 25, fig. 11). Fig. of male genitalia, from a species erroneously referred to *fraenata* (*amphigena* nob.).

Material studied: 1 ♂ ad., labelled: “Corée, HERZ”, and “*Macromia fraenata* S. ♂”, both in de DE SELYS’ hand; “*Macromia fraenata* SELYS mss., Révision R. MARTIN 1906, Type”, in MARTIN’s hand. 1 ♂, 1 ♀ ad., Japan, Kioto, VI and 20, VII. 1914, leg. T. MIYAKE (coll. RIS). 1 ♂ ad., Japan, Konosu, VII. 1913, d. A. HEYNE-Wilmersdorf (coll. RIS).

The much discussed *Macromia fraenata* which at last I have been able to examine, was described and figured by MARTIN—MENDER in the “Monograph”. The description, however, has apparently been drawn up from two, or perhaps even three, totally different species, one from Corea, the other (or others) indicated as inhabiting Tonkin. Not realizing how much confusion he caused, MARTIN in his monograph completed the chaos in indicating the male — and very probably also the female — from Tonkin as the types, at the same time allocating the only male from Corea in the ancient “collection SELYS”, also as the type of *fraenata*. I think, for the present, we stand but a poor chance of examining the Tonkinese specimens (certainly belonging to an other species, or even group!) and therefore I should have declared DE SELYS’ own specimen as the true holotype *fraenata*, — especially because it was *this* specimen of which we possess useful figures of the anal appendages and a photograph of the wings¹⁾ — if not a further examination had shown that the specimen must be attributed to an other species, already described, viz. *M. amphigena* SELYS!

¹⁾ The drawing of the entire insect on the coloured plate also points to the same Corean insect.

Dr. F. RIS has very kindly lent me some examples of *amphigena*, which enabled me to make a careful study of the two species, discussed here and I do not hesitate any more in referring MARTIN's *fraenata* to *amphigena* SELYS. Anyhow, it seems worth while to give a complete description of the puzzling insect; the points of distinction with *amphigena* are very slight and will be enumerated at the end of the description, to which I add a figure of the remarkable genitalia.

♂ ad. Corea. — Labium dark brown, middle lobe and base of side lobes clear yellow; base of mandibles likewise. Labrum shining black. Anteclypeus very dark brown. Postclypeus entirely sulphur-yellow. Frons black, with rich metallic green lustre, also present on the lower part. Excavation deep. Upper part of frons divided into two conspicuously flattened parts, each being somewhat framed, but less than in *M. moorei* and *fumata*. Seen from above each of these flattened parts bears a rounded spot of a clear yellow colour

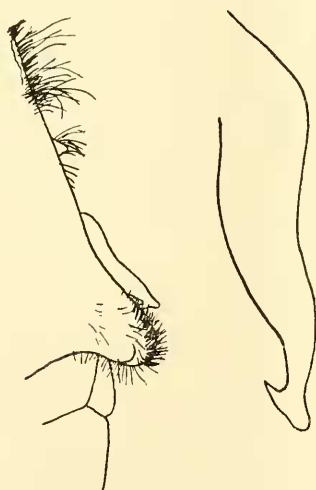


Fig. 13. *Macromia amphigena* SELYS. ♂ (Holotype *fraenata* MART.). Corea.

Genitalia, right side, and left hamulus, seen from the inner side.

partner anteriorly. Legs black, outer side of first coxa yellow.

at base, just in front of the vertex, which is metallic green. Occipital triangle and occiput black. Synthorax metallic green, with yellow bands. A very distinct yellow humeral band, extending rather more than half-way up the dorsum, its upper end being rounded. Below this stripe caeses before the first pleurum, which is black. Lateral yellow stripe over the stigma sharply defined, just not meeting the coxae of second pair. Latero-ventral margin of the metepimerum with a sharply defined creamy yellow band, running along the whole poststernum (which is black) and not meeting its

Wings almost entirely hyaline; a slight tinge of yellow in the anal area of the hind wing and at the tips of all four. Neuration: see fig. 82 of the "monograph". Cubito-anal cross veins $\frac{4.3}{2.3}$; *ht* $\frac{2.2}{1.1}$ (sic!). Pterostigma dark brown.

Abdomen stout. Black, without metallic lustre. Segm. 1 black. Base of segm. 2, including the auricles, for about one third of the length orange laterally; dorsum with two small lunules, interrupted in the middle line and not touching the base or apex of the segment. Segm. 3—6 with comparatively small paired lunules on the dorsum, just before the transverse carina of each segment, progressively smaller from before backwards. Those on segm. 6 very small. Basal third of 7 with an orange yellow mark roundabout; dorsally this mark bears a somewhat triangular protuberance at its end. Dorsum of segm. 8 with a narrow transverse mark just at base, occupying about $\frac{1}{6}$ of the total length. The ventral side of 8 is yellow for about its basal third. Segm. 9—10 and appendages black, save for a ventral yellowish spot on either side of 9 at base. (MARTIN's coloured figure 15 on Pl. III shows the yellow abdominal markings, those on segm. 4—6 having been drawn much too large).

Apps. see fig. 86 of the monograph. Genitalia on second segment (fig. 13a). As in *M. cydippe* LAIDLAW, I would call attention to the peculiar shape of the distal end of the hamule, which in this species always seems to be invisible, seen in profile; but *the point bears a very distinct hammer-like process, directed backward and inward* (fig. 13b).

Length: abd. + app. 49, hw. 43 : 12.5. pt. $\frac{2.25}{2.5}$ mm.

So far as I can see, the specimen only differs from typical *amphigena* by the presence of a rounded spot of yellow on each of the flattened parts of the frons, just at base and in front of the vertex. This spot is present in the female and absent in the two male specimens from Japan, which I have examined. Further, the total absence of any cross vein in the triangles and sub-triangles is noteworthy, but the existence of these veins is far from constant.

Group III.

Macromia cincta (RAMBUR 1842) (figs. 14—17).

- Macromia cincta* ♂♀ Rambur (*Hist. Nat. des Insectes Névroptères*, 1842, p. 141). Description from imperfect examples. — Patria ignota.
- „ „ ♂♀ Selys (*Synopsis des Cordul.*, 1871, pp. 119—120). First description of the entire insect. — Hab. Java.
- „ „ Selys (*Ann. Mus. Civ. Genova*, 1889, p. 468). Recorded from Banka (leg. Teysman, ♂ only) and Java.
- „ „ ♂♀ Karsch (*Entom. Nachrichten*, 17, 1891, p. 245). Mus. Berlin. — Hab. Sumatra (Deli).
- „ „ Krüger (*Stett. entom. Zeitung* 1899, p. 325 and 331—332). Comparative discussion with *M. borneensis*.
- „ „ Martin (*Monographie des Cordul.*, 1906, p. 68). Recorded from Penang, Java and Borneo.
- „ „ ♂ Laidlaw (*Proc. Zool. Soc., London*, 1913, p. 69). — Hab. Borneo (Sarawak, Baram).
- „ „ ♂ Laidlaw (*Idem*, 1920, p. 318). Same habitat.
- „ „ ♂ Laidlaw (*J. Str. Br. Royal. Asiat. Soc.* 85, 1922, pp. 220, 223—225). — Hab. Borneo (Sarawak).
- „ *borneensis* ♀ Krüger (*Stett. entom. Zeitung*, 1899, pp. 330—333). Mus. Stettin. — Hab. Borneo (Brunei).
- „ „ ♀ Martin (*Monographie des Cordul.*, 1906, pp. 68—69). — Hab. Borneo and Tonkin. The Tonkinese record is certainly false: see fig. A, which points to a distinct, hitherto unsufficiently described species.

I have devoted considerable time to the two species *Macromia cincta* RAMBUR and *borneensis* KRÜGER, united under one heading in the present paper. The difficulties arisen in consequence of the denomination of a new *Macromia* from N. Borneo, which — as stated by its author himself — was

very closely related to the well-known *M. cincta*, are numerous, especially because this new species, named by KRÜGER *borneensis*, only was known in the female sex, — as in so many analogous cases!

If KRÜGER had seen a male specimen of his new species, he undoubtedly would have seriously hesitated in giving it a new name; such, however was not the case and, premising that RAMBUR of neither sex had perfect specimens at his disposal, KRÜGER had to rely on the very indefinite description of the female *cincta* in DE SELYS' Synopsis.

The following lines are taken from RAMBUR's original description: — "Abdomen d'un bistre plus ou moins foncé, ayant la base velue en dessus, avec une large tache d'un blanc jaunâtre sur le premier segment, qui s'étend sur une partie du second; extrémité du troisième et quatrième présentant un cercle de la même couleur, échancré en dessus (*les segments suivants manquent dans les deux sexes*)". — DE SELYS amplifies this description in the Synopsis as follows: — "... aux 3^e—5^e [segment de l'abdomen] une tache médiane dorsale pâle devisée en deux lunules par l'arête; aux 6^e—7^e une tache basale de même couleur"; etc. And regarding the female: — "Abdomen un peu comprimé. Appendices anals un peu plus longs que le 10^e segment, coniques très-pointus. *Écaille vulvaire courte échancrée.*" — This last sentence became the stumbling-block to every investigator, including myself. We must suppose that DE SELYS has seen good specimens of both sexes, but it is unknown to me whether these insects came, at least the females. Anyhow, I have not seen a complete female of the true *cincta* and therefore the question about the specific value of *borneensis* can better be postponed. Fortunately the confusion in the synonymy of this group is confined to *cincta* and *borneensis*, and therefore in future it will not be difficult, to reach a better understanding of "these" species.

I have come to the conclusion that the structure of both the anal appendages and the genitalia of the male, is without any importance in discriminating the species; a study of these organs has been very disappointing, owing to their close similarity. Moreover the length of the inferior appendage

is liable to vary in both species. In the male specimens from Banka, which are certainly to be regarded as *cincta* sensu RAMBURI and SELYSI, the extension of the yellowish abdominal markings is somewhat larger than in the Bornean examples, except one male from Barabei, S. E. Borneo, which is exactly similar to the Banka males. Having now before me two excellent *couples* of *M. borneensis*, one from G. Marapok, N. Borneo, and the other from Maudomai, S. E. Borneo, there remains but very little doubt to the pure identity of the two species.

Material examined: 1 ♂ 1 ♀ (in fragments, RAMBUR's types), labelled: 1. gold, 2. "cincta Rb.", 3. "*Macromia cincta* RAMB. Type". Terminal segments missing (Mus. Brussels). 1 ♂ 1 ♀ (in fragments; terminal segm. lost), Java, MULLER (Mus. Leiden and Brussels, respectively). 4 ♂ Banka, 1872, TEYSMAN. In two males the terminal segments partly lost (Mus. Amsterdam). 1 ♂ 1 ♀, Br. N. Borneo, G. Marapok, Dent Province, coll. G., labelled by RIS: "*M. cincta borneensis* KRÜG." (Mus. Leiden). 1 ♂ S. E. Borneo, Barabei, 14. X. 1882 (Mus. Amsterdam). 1 ♂ 1 ♀ S. E. Borneo, Mandomai (coll. MORTON). 1 ♂ Borneo, Sarawak, leg. J. C. MOULTON (coll. LAIDLAW); described by LAIDLAW, loc. cit., 1922. 1 ♂ Borneo, Sarawak, Kuching, 21. VIII. 1896, d. ROLLE-Berlin (coll. RIS). 2 ♀ Borneo, W. C., labelled by DE SELYS: "*M. bivittata* S." (nom. nud.) and by MARTIN: "*M. borneensis* KRÜGER" (Mus. Brussels). 1 ♂ N. Palawan, Tai Tai, 18. IV. 1913, leg. JANSON (coll. MORTON).

♂♂ Banka. — Clypeus and mouth uniformly brown. Frons dark brown with a slight lustre of metallic blue, which is more marked on the upper part. Synthorax brown, with slight blue and violet reflex, especially at the upper part of the dorsum and along the pale creamy white or dull yellowish lateral band.

Wings hyaline, but in all specimens the extreme base of both front and hind wings has a very small spot of a dark brown colour in the costal and subcostal spaces (about 1 mm.). Anal field of hind wing palely tinged with yellow, just as the tips of the front wings, in one example. Pterostigma comparatively long. [RAMBUR: "le sommet (des ailes) et

quelquefois la base, très légèrement lavés de jaunâtre, celle ci marquée d'une tache allongée, étroite, d'un roux fuligineux ; angle anal des postérieures formant un petit angle un peu crochu, avec le bord interne échancré ; etc."].

Cubito-anal cross veins

$$\frac{6.5}{4.4}, \frac{5.5}{4.4}, \frac{5.6}{4.4}, \frac{6.5}{4.4}; \text{ ht } \frac{4.4}{2.2}, \frac{4.4}{2.2}, \frac{3.5}{2.2}, \frac{4.5}{2.2}.$$

Abdomen blackish brown dorsally. Ventral side, segm. 1—2 laterally and the terminal segments dull reddish brown. Second segm with a transverse band of a creamy yellow colour, running across the dorsum from one auricle to the other, not touching the base or apex of the segment. Seg. 3 with a dorsal spot of dull orange, immediately in front of the transverse carina. Seen from above this spot occupies about $\frac{1}{5}$ of the length; laterally it is somewhat broadened and occupies about $\frac{1}{4}$ of the total length of the segment; below it is creamy white. Segm. 4—6 have small paired lunules, similarly placed and of the same colour, progressively smaller from before backwards. On 6 it is clearly visible. Segm. 7 has a small and diffuse basal yellow mark on the dorsum, occupying about $\frac{1}{4}$ of the length. The remaining segments and the anal appendages are dull brownish. Spine on the dorsum of segm. 10 very conspicuous, sharply pointed. Lower anal appendage of equal length to upper pair (one ♂) or slightly longer (one ♀), not differing from those of Bornean examples. Genitalia on second segm. (fig. 14).

[RAMBUR: "hameçons n'étant pas bifides, formant deux longs crochets, assez grêles et contigus; penis très court et très-épais vers sa base, qui est recouverte par une sorte de languette un peu concave en dessous; lobe génital assez saillant, non arrondi, ayant son bord antérieur très épais et fortement cilié"].

I have examined the holotype ♂

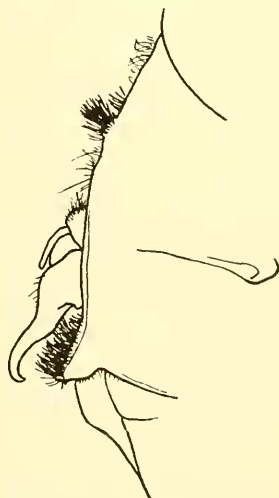


Fig. 14. — *Macromia cincta* RAMB. ♂. Banka. Genitalia.

of RAMBUR in the Brussels Museum; it is in a very bad condition. Cubito-anal cross veins $\frac{6}{3.3}$; $ht \frac{4}{2.2}$.

Length: abd. + app. 49 (one ♂), hw. 44 (4 ♂♂), pt. 3 mm.

♀. Two females, one RAMBUR's allotype, the other a very mutilated example from Java (MULLER leg.) in Mus. Brussels, may be described as follows: —

RAMBUR's allotype. Sine patria. — Golden brown spot at bases of front wings in costal and subcostal spaces reaching as far as halfway between antenodals 1—2; in hind wing in the same spaces as far as halfway between ant. 2—3, in median space as far as first cubito-anal cross vein.

$Cux \frac{6.6}{3.3}$; $ht \frac{4.3}{2.2}$. Abd. segm. 4—10 lost.

Java (MULLER leg.). — Indescribable. $Cux \frac{6.6}{3.3}$; $ht \frac{3.4}{2.2}$.

♂ Br. N. Borneo, G. Marapok. — Adult. Clypeus and mouth uniformly dark brown. Frons almost black, with a slight lustre of dark metallic blue above. Vertex black. Synthorax velvet brown, dorsum shining with rich metallic blue lustre, especially on the upper part and along the pale creamy yellow lateral band, on the sides.

Wings hyaline; extreme base of all four wings with a small spot in costal and subcostal spaces, dark reddish

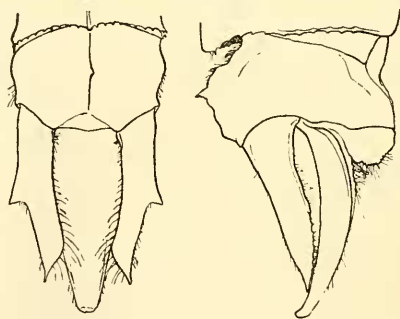


Fig 15. — *Macromia cincta* RAMB. ♂. Marapok.
Appendages, dorsal view and right side.

brown, in front wing reaching as far as half-way between antenodals 1—2, in hind wings a trace further. Anal field of the latter palely tinged with yellow. $Cux \frac{5.5}{4.4}$; $ht \frac{4.4}{2.2}$.

Abdomen blackish brown dorsally, segm. 1—2 at the sides and the terminal segments dark reddish brown. Markings dull orange yellow. Second segment as in the *Banka* specimens. Spots on 3—5 somewhat smaller; that on 3, seen from above, occupying about $\frac{1}{6}$ — $\frac{1}{7}$, in lateral about $\frac{1}{5}$ — $\frac{1}{6}$ of the length. Segm. 4—5 have small paired lunules, progressively smaller from before backwards. On 5 it is almost invisible, whilst 6 is entirely black. Segm. 7 has a very small and diffuse basal dorsal mark, occupying only about $\frac{1}{8}$ of the length. Remaining segments dark reddish brown. Spine on dorsum of segm. 10 and anal appendages identical in shape to the same organs in the *Banka* males. Lower anal appendage distinctly longer than upper pair (fig. 15). Genitalia almost exactly similar (fig. 16). Length: abd. + app. 48, hw. 44, pt. 3 mm.

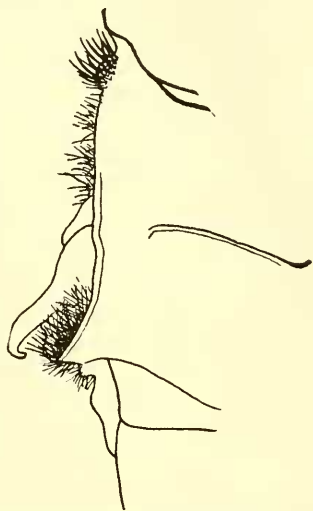


Fig. 16. — *Macromia cincta*
RAMB. ♂.
Marapok, Genitalia.

♂ S. E. Borneo, Mandomai. — Adult. Synthorax darkened, less metallic. Basal brown wing marks a trace more reduced. Wings enfumed throughout. Anal field of hinder pair distinctly yellow. $Cux \frac{5.5}{4.4}$; $ht \frac{3.4}{2.2}$.

Abdominal markings similar, but less conspicuous, those on segm. 5 almost invisible. Lower anal appendage equal in length to upper pair. Length: abd. + app. 47, hw. 43, pt. < 3 mm.

♂ S. E. Borneo, Barabei. — Adult. Wings as in the male. $Cux \frac{6.5}{4.4}$; $ht \frac{4.4}{2.2}$. Abdominal markings *exactly similar to those in the Banka males*; enlarged and of a creamy yellow colour. Spots on dorsum of segm. 6 clearly visible. Lower anal appendage equal in length to upper pair. Abd. + app. 48, hw 43, pt. 3 mm.

♀ Br. N. Borneo, G. Marapok. — Adult. Head as in the male. Synthorax warm brown, less metallic. A slight blue and violet reflex above only, on the dorsum and along the dull yellowish brown lateral stripe. Legs very dark brown, almost black; anterior femora brown exteriorly.

Wings hyaline. Golden brown basal marks conspicuous; in the front wings reaching as far as half-way between antenodals 2—3 in costal and subcostal spaces, in the hind wings to the third antenodal in costal space, between the third and fourth in subcostal space, to the arculus in median space, and to about the first cross vein in cubital space. Distal $\frac{1}{4}$ part of front wings tinged with yellow.

$$Cux \frac{5.6}{4.4}; ht \frac{4.4}{2.3}.$$

Abdomen very dark brown. Light markings darkened, yellowish brown, on segm. 2—5 and 7

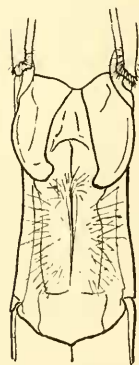


Fig. 17. — *Macromia cincta* RAMB ♀. Marapok. Ventral view of segm. 8—9, showing vulvar lamina.

enlarged, those on 5 and 7 however, small and less conspicuous. Valvula vulvae comparatively large, not projecting, entirely divided into two leaf-like lobes, each of which is somewhat pointed at the end (fig. 17) KRÜGER: „Die Scheidenklappe ist durchaus anders als bei *cincta*, sie entspricht einigermassen derjenigen von *flavicincta* SELYS, da sie aus 2 bis zum Grunde getheilten Blättern besteht, die aber nicht oval sind, sondern am Ende sich zuspitzen; sie reichen ebenfalls über $\frac{1}{3}$ des 9. Segments hinaus”. It may be noted here, that KRÜGER had never seen a good female of *cincta* RB.! Length: abd. + app. 50, hw. 49, pt. > 3 mm.

♀ S. E. Borneo, Mandomai. — Adult. Synthorax brown above with slight metallic lustre. Sides with yellowish band more marked and with distinct green and bluish metallic lustre. Wings heavily enfumed throughout, but especially in discoidal field of hinder pair and at apices of front pair.

$$\text{Basal markings as in the foregoing. } Cux \frac{6.6}{4.4}; ht \frac{4.4}{2.2}.$$

Abdomen similar. Yellow markings very small and darkened, only very slightly larger than in the corresponding male. Segm. 6 seems to be entirely black. Length: abd. + app. \pm 50. hw. 48, pt. 3 mm.

2 ♀♀ Borneo, W. C., Mus. Brussels. — Adult. Synthorax with slight metallic lustre. Wings hyaline; basal brown markings in one specimen very little larger than in the Marapok ♀. Tips of front wings in both specimens yellowish.

$$Cux \frac{6.6}{4.4} \text{ and } \frac{6.6}{4.4}; ht \frac{5.4}{2.3} \text{ and } \frac{5.5}{3.2}.$$

Abdominal markings very conspicuous, enlarged, dark orange brown. Segm. 2 as in the foregoing examples. 3—7 With large marks close to the transverse carina, divided into two stretched semi-lunar spots, occupying roughly $\frac{1}{2}$ — $\frac{1}{3}$ of the length of the segment. Hence a marking is also present on segm. 6. On 7 it occupies $\frac{1}{3}$ of the length of it. Remaining segments dark brown. Length: abd. 52, hw. 49—50, pt. 3 mm.

Group IV.

Macromia polyhymnia sp. nov. (figs. 18, a—c).

1 ♂ ad., Sumatra, P.B., Fort de Kock, 920 m., VIII. 1924, leg. E. JACOBSON.

Labium light brown, remaining parts of face dark reddish brown. Lower part of frons granular, shining, deep reddish brown, mingled with metallic green; its lateral parts very dark brown, shining. Excavation of frons rather deep; upper part and vertex metallic green. Synthorax metallic green above and at the sides, with a sharply defined yellow humeral band (width > 1 mm.), extending rather more than half-way up the dorsum. Lateral yellow stripe covering the stigma conspicuous, but hardly broader than 1 mm.; it runs roundabout synthorax (between first and second coxae). Legs very long and slender (femora 3 reach as far as tip of genital hamule), wholly black. Tibial lamina distinctly yellow, along nearly the full length of third pair, less than distal half of first pair, absent on second pair.

Wings entirely hyaline. Interior margin of costa with hardly visible yellow line. Membranule dark greyish, whitish

at base. Anal angle rather rounded. Margin between membranule and angle but slightly concave. Nodal index $\frac{6.14.}{8.9.} \frac{14.6}{10.9}$; cubito-anal cross veins $\frac{5.5}{3.3}$; $ht \frac{3.3}{2.2}$. Cross vein in the anal triangle conspicuously arched (i. o. w. convex posteriorly) ¹⁾.

Abdomen long and slender. Segm. 1--2 scarcely inflated and 7--9 little dilated in lateral, much in dorso-ventral dimension. Segm. 1 black. Segm. 2--6 black with a slight lustre of metallic green dorsally and at the sides. Segm. 2 with a large, oblique yellow spot, running from one auricle to the terminal end of segm. 1 quite ventrally, only touching the base of the second segm. itself. A somewhat smaller yellow spot mid-dorsally, divided into two by the longitudinal median carina. Segm. 3 with a very small lateral yellow stripe at the base and a minute dorsal spot of a more orange colour immediately in front of the transverse carina, divided into two by the longitudinal median carina.

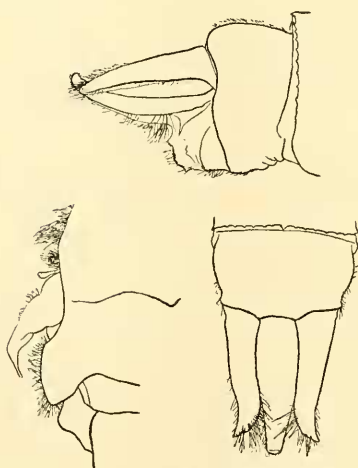


Fig. 18 (a-c). — *Macromia polyhymnia* nov. ♂. Fort de Kock, a and c Appendages, b Genitalia.

Segm. 4--6 without any trace of markings. Segm 7 has a bright orange basal mark, on the dorsum only, occupying little more than $\frac{1}{5}$ of the length of the segment; its extreme base remains just free of it. Segm. 8 with a lateral orange mark, occupying the basal half of it and embracing also the latero-ventral part of it. Below it is black. Segm. 9--10 and appendages wholly black. There is no dorsal process on the tenth segment.

Appendages quite simple. Lower anal appendage a trace longer than upper pair. These latter nearly straight, very slightly recurved apically and without any indication of an

¹⁾ Possibly a specific character?

extero-lateral tooth (fig. 18, a and c). Genital lobe of the second segm. broad, without a stiff bunch of hairs (fig. 18b).

Length: abd. + app. 42, hw. 35 : 10.5, pt. $\frac{1.8}{1.75}$ mm.

Female unknown.

This fine little species is readily distinguished from its allies by the quite simple appendages, by the absence of a dorsal process (or even of a longitudinal ridge) on the tenth abdominal segment; by the dark face and by the presence of a distinct humeral band. Its nearest relative would seem to be *M. corycia* LAIDLAW, from Borneo.

The specimen is the holotype. Mus. Amsterdam.

*** *Macromia corycia* LAIDLAW 1922.**

Macromia corycia ♂ Laidlaw (J. Str. Br. Royal Asiat. Soc., 85, 1922, p. 220, 225, fig. 5, genitalia). Brit. Mus. — Hab. Borneo (Sarawak, Ula Baram).

***Macromia calliope* RIS 1916.**

Macromia calliope ♂ Ris (*Supplementa Entomologica*, Berlin, 5, 1916, p. 65, 70—71, Textfig. 44—45 & Taf. 3, Fg. 4). This specimen is the holotype. Mus. Stockholm. — Hab. Tonkin.

» » pars! ♂ only, Laidlaw (J. Str. Br. Royal Asiat. Soc., 85, 1922, p. 221, 227—228). Female specimen (Laidlaw's allotype) = *M. urania* RIS, Coll. m. — Hab. Tonkin.

Through the kindness of Dr. LAIDLAW, I had the opportunity of studying a male and a female of a *Macromia*, both referred by him to *M. calliope* RIS. Undoubtedly the identification of the male is correct, but I am convinced that the only female specimen must belong to an other, allied species, viz *M. urania* RIS. In the original description of his purchased female allotype, LAIDLAW has already pointed out the differences in size between the two sexes, at that time at his disposal. Moreover *calliope*, it may be remembered, is characterized (at least in the male sex) by the *black* postclypeus and by the absence of yellow markings on

segm. 4—6. In the female now before me, however, the postclypeus is distinctly yellow, and segm. 4, 5 and 6 are spotted with yellow. Quite fortunately I saw a second female *Macromia*, from the same country, in the Leiden Museum, undoubtedly belonging to *M. urania*, being almost identical with LAIDLAW's female specimen. Consequently the female of *M. calliope* remains still unknown.

***Macromia septima* MARTIN 1904 (figs. 19—20).**

Macromia septima ♀ Martin (*Mission Pavie*, III, Zool., 1904, p. 211). This specimen is the holotype. Mus. Paris?. — Hab. Java.

The specimens of the opposite sex, described in this paper, are surely not conspecific, and came from "Annam et Tonkin".

» » ♀ Martin (*Monographie des Cordul.*, Coll. Selys, 1906, p. 70): In this paper Martin mentions the occurrence of two ♂ and three ♀ in de Selys' collection, but he gives no description. — Hab. Java.

Material studied: 2 ♂ 2 ♀, labelled by DE SELYS: Java FR. 93 (1 ♂ ad.), Java FR. (1 ♂ juv.), Java FR. 93 (1 ♀ ad.) Java FR. 93 (1 ♀ juv.) — One female, labelled by DE SELYS himself: "*Macromia septima*, n. sp.", belongs to an *other* species, very probably *M. gerstaeckeri* KRÜGER; it lacks the abdomen¹). All these five specimens are labelled by MARTIN: "*Macromia septima* MARTIN". — 1 ♀ ad., Java, Soekaboemi (d. A. J. LESTAGE 1921), coll. RIS (Two other ♀♀ in coll. LESTAGE not seen by me).

♂ ad. Java (Mus. Brussels). — Allotype, hitherto undescribed.

All parts of the face uniformly reddish brown, clypeus with an olive-brown tinge. Lower part of the frons reddish brown, shining. Its upper portion with slight blue metallic lustre and without flattened or framed inner part. Synthorax

¹) This specimen is one of the three females, mentioned by MARTIN in his monograph as belonging to *M. septima*. As DE SELYS did not describe this specimen, quite fortunately the name *septima*, adopted by MARTIN, can remain.

for the greater part metallic blue. Dorsum less metallic, its lower part brownish. A distinct yellow humeral band present, occupying the whole first pleurum and extending exactly half-way up the dorsum. Lateral yellow stripe over the stigma sharply defined, not meeting the lower part of the humeral band. Latero-ventral margin of the metepimerum yellow, in its distal portion largely confluent with the yellowish poststernum, which emancipates a crescent-shaped blackish spot on either side at its base. Legs black; coxae and femora dark reddish brown, especially at their outer sides.

Wings entirely hyaline. Interior margin of costa with extremely narrow yellow line. Membranule greyish, a trace darker at the end. Anal angle not acute. Margin between mem-

branule and angle slightly concave. Nodal index $\frac{6.14}{7.10} | \frac{15.6}{9.8}$;

cubito-anal cross veins $\frac{4.4}{3.4}$; *ht* $\frac{4.3}{2.2}$.

Abdomen slender, segm. 1—2 little inflated; 4—6 cylindrical; 7—9 scarcely dilated in lateral, much in dorso-ventral dimension. Segm. 1 black. Segm. 2—6 black, rather shining, without metallic lustre. Segm. 7—10 dull black. Segm. 2 has a transverse band of orange yellow, running across the dorsum; seen from above not touching the base or apex of the segment and occupying about $\frac{1}{3}$ of it. In lateral this band occupies the basal half of the segment and touches the apical border of segm. 1. Segm. 3—4 with paired orange lunules on the dorsum, immediately in front of the transverse carina. These spots very small on segm. 3 and almost invisible on 4. Segm. 5—6 black. Segm. 7 has an orange mark at base, occupying less than $\frac{1}{3}$ of the total length; it bears a minute triangular protuberance at its end. Segm. 8 black, with a latero-ventral spot of orange at base. Segm. 9—10 and appendages black. An indistinct longitudinal ridge on dorsum of tenth segment, but no dorsal process.

Appendages (fig. 19). The genital lobe of second segm. hairy, but *without* brushy hairs, directed forward. No short stiff hairs at the ventral margin of the second segment. Hamule very slender and curved outward at the tip (fig. 20).

Length: abd. + app. 43, hw. 35:11, pt. 2 mm.

♂ juv. Java (Mus. Brussels). — This very teneral specimen

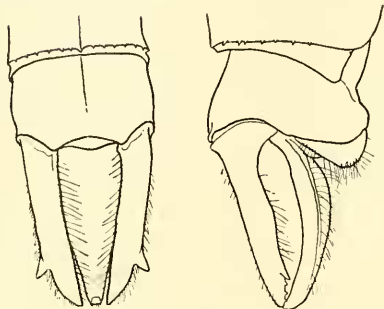


Fig. 19. — *Macromia septima* MART.
♂ Allotype. Java. Appendages, dorsal
view and right side.



Fig. 20. — *Macromia septima*
MART. ♂ Allotype. Java.
Genitalia.

needs no description. The wings are heavily damaged and the body is deformed by pressure. $Cux \frac{4.4}{4.3}$; $ht \frac{3.3}{2.2}$. Length of hind wing 34 mm.

♀ ad. Java (Mus. Brussels). — Colour of the face as in the male. Lower part of frons warm reddish brown, rather shining; excavation deep: seen from behind the frons is divided into two widely separated tubercles, each of which is pointed at the end. Upper part of frons and vertex very dark brownish, not metallic. Synthorax brown. Dorsum brownish with a slight mingling of metallic blue, as it passes dorsalwards acquiring an indefinite metallic blue lustre. Moreover there is a distinct, but narrow, dull yellow humeral band, occupying the whole first pleurum (on which it is light brown) and extending exactly half-way up the dorsum. At its upper end it is somewhat pointed.¹⁾ Sides metallic blue. Lateral yellow stripe covering the stigma straight, as in the male. Latero-ventral margin of the metepimerum coloured as in the male, but it is light brown. Legs black, coxae and femora, the latter especially at their outer sides, brownish.

¹⁾ It seems quite probable that MARTIN has overlooked the existence of this humeral band.

Wings with a dull orange tint throughout. Some groups of cells and veins irregularly smoky. Costa entirely black. Membranule greyish, especially at the end. Nodal index

$$\frac{5.14}{7.10} \bigg| \frac{14.5}{9.9}; \text{ cubito-anal cross veins } \frac{5.5}{4.4}; ht \frac{3.3}{2.2}.$$

Abdominal segments 1—2 as in the male. Segm. 3—6 with comparatively small, paired, orange lunules on the dorsum, immediately in front of the transverse carina. These spots are larger than in the opposite sex, but on segm. 6 they are only very small. Segm. 7 with an orange mark at base, roundabout the segment, occupying about $\frac{1}{3}$ of it; it bears a very inconspicuous triangular protuberance at its end. Segm. 8 black, with a ventral spot of orange at base. Segm. 9—10 and appendages black. Vulvar scale invisible (at any rate very short). Length: abd. + app. 42, hw. 39:11.5, pt. 2.5 mm.

♀ ad. Soekaboemi. — This specimen is almost identical with the preceding, save for the wings, which are next to hyaline; in spite of that, the specimen is quite mature, as it bears a lump of dried eggs on the ninth segment. Nodal index $\frac{7.16}{10.10} \bigg| \frac{16.7}{10.10}$; *Cux* $\frac{6.5}{4.4}$; *ht* $\frac{4.4}{2.3}$. Length: abd. + app. 43, hw. 39:11.5, pt. < 2.5 mm.

♀ juv. Java (Mus. Brussels). — Very teneral. Humeral band well visible. Nodal index $\frac{6.15}{8.10} \bigg| \frac{15.7}{10.7}$; *Cux* $\frac{5.4}{4.4}$; *ht* $\frac{3.4}{2.2}$. Length of hind wing 39:11 mm.

All specimens, which I have been able to examine together, are certainly conspecific.

***Macromia thalia*, nov. nom. (fig. 21).**

Macromia ? *fraenata* ♂ Laidlaw (J. Str. Br. Royal Asiat. Soc., 85, 1922, pp. 221—222 and pp. 226—227, fig. 7). Brit. Mus. — Hab. ? Khasia Hills.

1 ♂ ad., ? Assam, Khasia Hills. Holotype.

This insect, provisionally referred to *M. fraenata* (= *amphigena* SEL.) by Dr. LAIDLAW, has proved to be a distinct

species, which can not be referred to any of the known

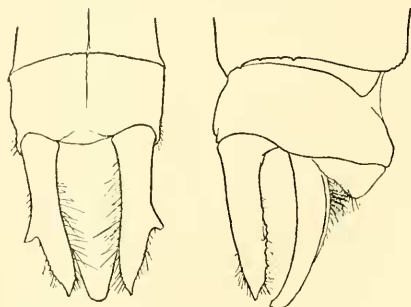


Fig. 21. — *Macromia thalia* nov. ♂.
Holotype. Khasi Hills? Appendages,
dorsal view and right side.

malaysian species. I wish to express my warm thanks to Dr. LAIDLAW, who was generous enough to lend me his specimen for comparison.

To the ample description I have nothing to add. The genital structure of the second abdominal segment has been figured already by LAIDLAW in a sufficient way¹⁾. An additional drawing of the anal appendages may still be of use to the student (fig. 21).

The species is closely related to both *urania* and *calliope*.

* *Macromia callisto* LAIDLAW 1922.

- Macromia gerstaeckeri* ♂♀ Laidlaw (*Proc. Zool. Soc.*, London 1902, pp. 76—77). Mus. Cambridge. — Hab. Malacca, Kelantan (Kuala Aring).
 „ *callisto* ♂♀ Laidlaw (*J. Str. Br. Royal Asiat. Soc.*, 85, 1922, p. 221, 225—226, fig. 6, genitalia ♂). Same specimens.

Macromia urania RIS 1916 (fig. 22).

- Macromia urania* ♂♀ Ris (*Supplementa Entomologica*, Berlin, 5, 1916, p. 66, 68—70, Textfig. 42—43 & Taf. 3, Fig. 2—3). Mus. Stockholm. — Hab. Tonkin.
 „ „ ♂ Laidlaw (*J. Str. Br. Royal Asiat. Soc.*, 85, 1922, pp. 220—221 and 227). Coll. Laidlaw. — Hab. Tonkin.
 „ *calliope* ♀ Laidlaw (*Ibid.*, p. 221 & pp. 227—228). Coll. m. — Hab. Tonkin.

¹⁾ His figure (loc. cit.) shows the genital hamule and the lobe. The distal half of the hamule is slender, almost straight, the extreme tip of it is curled outward. The round bubble, close to the basal part of the hamule, as shown in this figure, is a part of the penis. The whole external genital apparatus is somewhat conglutinated in this specimen; hence, a good figure is very difficult to make.

Material examined: 1 ♀ ad., Tonkin, Than Moi, VI—VII., leg. H. FRUHSTORFER (Mus. Leiden). 1 ♀ ad., Tonkin, without date (ex coll. LAIDLAW, in my coll.)¹⁾.

Both specimens are in good condition and fully mature. Although they are in sufficient accordance with the original description, the following notes may be useful.

♀ (Than Moi). — Labium very dark brown, median lobe and extreme bases of lateral lobes yellowish. Labrum black with a small yellow streak at base and a small spot of the same colour at the sides. Anteclypeus black. Postclypeus pale yellow, finely bordered with black in front. Frons entirely shining black, with dark metallic blue lustre; excavation very deep. Vertex high, metallic. Occiput and occipital triangle shining black. Synthorax black, with bright metallic blue lustre. Humeral band conspicuous, sharply defined, extending about $\frac{2}{3}$ up the dorsum (less than 1 mm. wide). Lateral yellow stripe over the stigma straight, roundabout the thorax, dark yellow (over 1 mm. wide). A well defined yellow stripe along the latero-ventral border of the metepimerum. Near the anterior border of first segm. this stripe broadens to ca. 1 mm. or less. Ventral side of thorax black, with dull yellowish sutures. Legs black, first and second coxae yellow posteriorly.

Wings heavily enfumed throughout. Wing bases and extreme tips diffusely orange brown.

Abdomen: segm. 1 black. Segm. 2 likewise, but with a large transverse, orange yellow band, occupying $\frac{1}{3}$ of the whole length, mid-dorsally, not touching the base or apex of it and somewhat constricted in the middle. This mark is considerably broadened laterally, occupying the basal $\frac{2}{3}$ of the segment and touching the base of it. Segm. 3—6 black, with paired brownish orange lunules on the dorsum of each, immediately in front of the transverse carina, progressively smaller from before backwards (Moreover, segm. 3 with a narrow lateral yellow stripe at base). On segm. 6 the dorsal lunules are reduced so as to be almost

¹⁾ Together with some other specimens, LAIDLAW kindly gave me this example.

absent. Segm. 7 with large orange basal mark, occupying more than $\frac{1}{3}$ of the length; it bears a distinct triangular protuberance at the end. Segm. 8 with a latero-basal citron-yellow spot and a narrow oblique yellow stripe on each side of the longitudinal carina, at base. Segm. 9—10 and appendages black. Latero-ventral sides of the tergites of segm. 2—7 finely bordered with reddish brown.

Vulvar lamina very small, somewhat trapezoid, with a triangular excision at apex (fig. 22).

Length: abd. + app. 50, hw. 41, pt. $\frac{2.5}{2.5}$ mm. Nodal index $\frac{8.16.16.7}{11.11.11.9}$; *Cux* $\frac{6.5}{4.4}$; *ht* $\frac{4.4}{3.3}$. Costa black. Membranule dark grey.

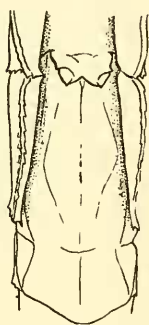


Fig. 22. — *Macromia urania* RIS. ♀. Tonkin. Ventral view of segm. 8—9, showing vulvar lamina.

♀ (Tonkin). This specimen — LAIDLAW'S allotype *calliope* RIS — only differs in the following respects:

1. Small fronto-basal yellow streak on labrum still more reduced.
2. Orange yellow band on dorsum and sides of segm. 2, and dorsal spots on segm. 6 somewhat larger.
3. Latero-basal citron-yellow spot on segm. 1 hardly visible and the narrow oblique basal stripe on the dorsum absent.

Vulvar lamina and shape of the sternites of last segments as in the foregoing specimen.

Length: abd. + app. 48, hw. 41, pt. $\frac{2.5}{2.5}$ mm. Nodal index $\frac{8.19.19.3}{10.13.13.11}$; *Cux* $\frac{5.5}{4.4}$; *ht* $\frac{3.4}{3.3}$. Costa black. Membranule dark grey.

For a more detailed description of this ♀, the reader is referred to LAIDLAW'S paper (loc. cit., p. 221 and 228).

***Macromia gerstaeckeri* KRÜGER 1899.**

Macromia gerstaeckeri ♂♀ Krüger (*Stett. entom. Zeitung*, 60, 1899, pp. 335—338). Mus. Stettin. — Hab. Java.

- Macromia gerstaeckeri* Martin (*Monographie des Cordul.*, Cat. Selys, 1906, p. 70). The habitat Borneo and Tonkin, mentioned here, is at least very doubtful.
- „ „ ♂ Laidlaw (*J. Str. Br. Royal Asiat. Soc.*, 85, 1922, pp. 225—226). Comparative discussion with *M. callisto* Laid.
- „ nec „ ♂ Laidlaw (*Proc. Zool. Soc., London*, 1902, pp. 76—77). Vide sub *M. callisto* Laid.

Material studied: 1 ♀ ad. (abdomen missing), labelled: "Java mer. FR.", in DE SELYS' hand, and "*M. septima* MARTIN", in MARTIN'S hand; Mus. Brussels.

This specimen, which unfortunately lacks its abdomen, was placed under *M. septima* in the ancient "Collection SELYS". There is no doubt, however, about the inexact determination. I feel sure in referring it to KRÜGER'S *gerstaeckeri*.

Although allied to *septima* MARTIN, especially in its size and in the structure of the anal appendages in the ♂ (which I have not seen), it is greatly distinguished by the yellow postclypeus. The yellow humeral band on the synthorax is sharply defined, like as the yellow stripe along the latero-ventral margin of the metepimerum; hence, in these respects corresponding with the original description. The anal area of the hind wing is distinctly narrower and less densely reticulated than in three ♀♀ of *septima*, which I could examine. The anal loop is shorter and contains only 6—7 cells (against 10—13 in three ♀♀ *septima*).

Length of hind wing 36 mm.

Finished: Nov. 1928.

APPENDIX.

1. In the present paper the *types* of the following species of *Macromia* have been examined by the author:

M. melpomene RIS (♂♀), *euterpe* LAID. (♂ paratype), *moorei moorei* SEL. (♀), *moorei fumata* KRÜG. (♂ plesio-

- type), *icterica* LIEFT. (♂), *cincta* RB. (♂♀), *polyhymnia* LIEFT. (♂), *septima* MART. (♂), and *thalia* LIEFT. (♂).
2. As to *M. westwoodi* SEL., since this Revision was submitted for publication, the following important Javanese dates have been reached by me:
 Java, res. Banjoemas, Batoerraden, G. Slamet, 2500 ft., leg. F. C. DRESCHER, 1 ♂, 1 ♀ (ad., in cop.), 8. X. 1928; 4 ♀ (teneral), 16. IX. and 22. X. 1928.
 3. It may be noted that the habitat of the eastern subspecies *M. moorei fumata* KRÜG., so far as we know at present, is Malacca, Java and Celebes. It is evident, however, that we may expect a larger distribution of this race. Without much doubt we may predict its occurrence on Sumatra and very probable also on Borneo. For the rest and concerning other species, the author has designedly abstained from geographical considerations.
 4. According to custom, all figures in this paper have been made from *dry* insects, with a drawing prism fixed on a REICHERT microscope. All are original and *have not been drawn to scale*.
 5. In discussing *venation*, I have retained the revised notation of the COMSTOCK-NEEDHAM terminology, given by R. J. TILLYARD in his book *The Biology of Dragonflies* (1917), although the thoroughly altered nomenclature of some of the main-veins of the dragonfly-wing, proposed by this author in his paper on *The Lower Permian Insects of Kansas* (Entom. News, XXXIV, 1923), will be adopted in the author's future publications, except in his paper on the genus *Epophthalmia*.
-